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STATISTICAL REPORT

ON THE

HEALTH OF THE ARMY IN 1864.

BY

T. GRAHAM BALFOUR, M.D., F.R.S.,

DEPUTY INSPECTOR-GENERAL OF HOSPITALS, AND HEAD OF THE STATISTICAL BRANCH.

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ERRATA IN REPORT FOR 1863.

Page 22, 73rd Regiment, Ratio Invalided, *for* 35·66 *read* 21·08.
„ 110, second Table, New Zealand, *for* 13·91 days *read* 11,05 days.
„ 115, first Table, Ophthalmia *for* 190 *read* 100.
„ 155, Table. To Mediterranean, *for* 142·8 *read* 125·0.
„ „ „ „ . *for* 714·3 *read* 625·0.

TO THE DIRECTOR-GENERAL

OF THE

ARMY MEDICAL DEPARTMENT.

SIR,

I HAVE the honour to submit the Statistical Report on the health of the Army for the year 1864.

The information respecting the Recruiting is more complete than in the previous volumes, as the results of the inspection of Recruits by civil medical practitioners are shown for the first time.

Meteorological Returns from such stations as furnished a complete set of observations for the year, taken with verified instruments, will be found in the Appendix. It is anticipated that in future volumes a much larger number of stations will be included.

I have the honour to be,

Sir,

Your most obedient humble servant,

T. GRAHAM BALFOUR,

Deputy Inspector-General.

Whitehall Yard,
July, 1866.

STATISTICAL REPORT FOR 1864.

I.—ON THE HEALTH OF THE TROOPS SERVING IN THE UNITED KINGDOM, IN 1864.

Section I.

Sickness and Mortality.

United Kingdom

THE average strength of the troops serving in the United Kingdom during the 53 weeks ending 30th December, 1864, as shown by the weekly returns, was 73,252; the admissions into hospital among them amounted to 70,806, the deaths to 732, and the average constantly sick to 3,491. These numbers give the annual ratio of 967 admissions, 9·99 deaths, and 47·66 constantly sick, per 1,000 of mean strength.

The following Table shows the relation which these ratios bear to th average of the four preceding years.

	Ratio per 1,000 of Mean Strength.		
	Admitted into Hospital.	Died.	Constantly Sick.
1864..	967	9·99	47·66
1860–63	1,010	9·24	53·13

The admissions into hospital and the average constantly sick have been under, but the deaths have been 0·75 above, the average of the four preceding years. Compared with the results for 1863 there has been a very slight increase in the admissions, but in t deaths it has amounted to 1·13 per 1,000 of the strength.

United Kingdom. The admissions and deaths by the different classes of diseases are shown in the following Table :—

Orders.	Average Strength, 73,252.	Admitted into Hospital	Died.			Ratio per 1,000 of Mean Strength.			
						1864.		1860–3.	
			With the Regiment.	Absent from the Regiment.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	14,195	90	9	99	193·8	1·35	215·2	1·02
2	Enthetic „ ..	21,296	9	..	9	290·7	·12	342·2	·11
3	Dietic „ ..	681	6	..	6	9·3	·08	7·0	·06
4	Parasitic „ ..	2,865	..	..	..	39·1	..	38·5	·01
	Class II.								
1	Diathetic Diseases ..	301	7	1	8	4·1	·11	2·6	·14
2	Tubercular „ ..	1,203	174	41	215	16·4	2·94	18·2	3·37
	Class III. Diseases of the—								
1	Nervous System ..	1,423	56	11	67	19·4	·91	19·3	·69
2	Circulatory „ ..	623	78	9	87	8·5	1·19	8·9	·76
3	Respiratory „ ..	6,575	92	12	104	89·8	1·42	92·9	1·40
4	Digestive „ ..	2,755	46	4	50	37·6	·68	37·7	·50
5	Urinary „ ..	215	9	1	10	2·9	·14	2·8	·12
6	Reproductive „ ..	929	..	..	..	12·7	..	8·6	..
7	Locomotive „ ..	349	1	..	1	4·8	·01	3·7	·02
8	Integumentary „ ..	10,178	2	..	2	138·9	·03	125·3	·09
	Class IV.								
4	Diseases of Nutrition..	169	1	..	1	2·3	·01	2·0	·08
	Class V.								
1	Accidents	6,904	40	6	46	94·3	·63	81·4	·62
3	Homicide	..	3	..	3	..	·04	·2	·02
4	Suicide	11	20	4	24	·2	·33		·26
5	Execution	..	..	..	..	..	..	..	·01
6	Corporal Punishment..	119	..	..	..	1·6	..	2·1	..
	No Appreciable Disease	13	..	..	..	·2	..	1·8	·01
	Not specified	1	..	..	..				
	Malingering	1	..	..	..				
	Total ..	70,806	634	98	732	966·6	9·99	1010·4	9·24

This Table shows the admissions to have been 44 per 1,000 under, and the deaths ·75 per 1,000 above, the average of the four preceding years, the difference being most marked in the admissions by miasmatic diseases and in the mortality by diseases of the circulatory system. This increase in the ratio of deaths in 1864 has not, however, been confined to the army, as the Registrar General's returns show the mortality of the general population of England and Wales to have been 1·71 per 1,000 in excess of the average of the ten preceding years, and to have been higher than in any year since 1849, when cholera prevailed as an epidemic throughout the country.

Adopting the grouping of stations as detailed in the Report for 1862, we find the admissions into hospital, deaths, and mean daily sick in each group to have been as follows :—

United Kingdom

	Average Strength.	Admitted into Hospital.	Died.	Average constantly Sick.
1. Seaport Towns	9,317	8,687	107	471
2. Dockyards and Arsenals	9,615	8,755	90	414
3. Camps	20,205	19,191	147	991
4. Large Manufacturing Towns ..	3,131	3,643	27	149
5. London and Windsor	5,694	5,713	47	309
6. Dublin	4,696	4,258	42	252
7. Stations of Depôt Battalions not included in preceding groups..	11,952	12,915	94	553
8. Remaining Stations	8,642	7,644	80	352
9. Detached from their Corps ..	..	..	98	..
Total ..	73,252	70,806	732	3,491

The following Table shows the results compared with the average of the four preceding years :—

	Ratio per 1,000 of Strength.					
	1864.			1860–63.		
	Admitted into Hospital.	Died.	Constantly Sick.	Admitted into Hospital.	Died.	Constantly Sick.
1. Seaport Towns	932	11·49	50·55	1,037	8·17	55·97
2. Dockyards and Arsenals ..	911	9·36	43·06	1,221	10·02	63·62
3. Camps	950	7·27	49·05	929	6·24	50·15
4. Large Manufacturing Towns	1,163	8·62	47·59	1,016	8·80	49·05
5. London and Windsor	1,003	8·26	54·27	912	8·37	52·84
6. Dublin	907	8·94	53·80	971	7·91	56·33
7. Stations of Depôt Battalions not included in preceding groups	1,081	7·86	46·27	1,045	9·09	54·37
8. Remaining Stations ..	884	9·26	40·73	981	6·35	42·93
Total, including men detached from their Corps	967	9·99	47·66	1,010	9·24	53·13

There has been an increase in 1864 in the admissions into hospital in London, the large manufacturing towns, the Stations of Depôt Battalions, and the Camps, and a decrease in the other four groups. The mortality has been considerably in excess of the average at the Seaport Towns and the group "remaining Stations," and has been one per 1,000 above it at the Camps and in Dublin. The ratio of deaths at the Camps, however, is still lower than at any of the other groups.

The admissions and deaths by the different classes of diseases at each group of stations were as follows :—

Orders.	Groups of Stations ..	Seaports.		Dockyards and Arsenals.		Camps.		Manufacturing Towns.		London and Windsor.		Dublin.		Depôt Battalions.		Remaining Stations.	
	Average Strength ..	9,317		9,615		20,205		3,131		5,694		4,696		11,952		8,642	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																
1	Miasmatic Diseases ..	1,583	9	1,717	12	3,392	16	755	7	1,290	12	690	9	3,267	18	1,501	7
2	Enthetic „ ..	2,849	5	2,477	1	6,327	2	940	..	1,712	..	1,728	..	3,095	..	2,168	1
3	Dietic „ ..	123	..	75	1	129	..	21	1	51	..	28	..	159	2	95	2
4	Parasitic „ ..	350	..	382	..	640	..	306	..	241	..	48	..	642	..	256	..
	Class II.																
1	Diathetic Diseases ..	36	3	44	..	78	2	15	..	31	1	19	1	36	..	42	..
2	Tubercular „ ..	136	23	202	31	362	40	36	8	105	11	79	11	162	29	121	21
	Class III. Diseases of the—																
1	Nervous System ..	162	15	205	7	398	11	47	1	62	2	72	4	318	6	159	10
2	Circulatory „ ..	84	11	80	13	187	19	22	4	45	3	50	4	112	15	43	9
3	Respiratory „ ..	849	13	945	11	1,728	27	260	1	694	10	362	5	1,017	12	720	13
4	Digestive „ ..	359	11	339	8	700	12	152	2	247	1	153	2	541	7	264	3
5	Urinary „ ..	35	3	23	2	58	2	10	1	11	..	14	1	48	..	16	..
6	Reproductive „ ..	113	..	108	..	309	..	36	..	45	..	63	..	126	..	129	..
7	Locomotive „ ..	41	..	54	..	84	1	16	..	11	..	26	..	90	..	27	..
8	Integumentary „ ..	1,111	1	1,222	1	2,796	..	659	..	710	..	554	..	2,006	..	1,120	..
	Class IV.																
4	Diseases of Nutrition ..	17	..	31	..	39	..	12	..	12	..	6	..	41	..	11	1
	Class V.																
1	Accidents	829	10	846	2	1,930	6	335	..	435	5	350	3	1,222	3	957	11
3	Homicide	..	..	..	..	..	2	..	..	..	..	..	1	..	..	..	..
4	Suicide	..	3	1	1	4	7	2	2	..	2	..	1	1	2	3	2
5	Corporal Punishment ..	7	..	3	..	26	..	18	..	9	..	16	..	28	..	12	..
	Diseases not specified ..	3	..	1	..	4	..	1	..	2	..	..	..	4	..	..	..
	Total	8,687	107	8,755	90	19,191	147	3,643	27	5,713	47	4,258	42	12,915	94	7,644	80

RATIO per 1,000 of MEAN STRENGTH.

Orders.	Groups of Stations ..	Seaports.		Dockyards and Arsenals.		Camps.		Manufacturing Towns.		London and Windsor.		Dublin.		Depôt Battalions.		Remaining Stations.	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																
1	Miasmatic Diseases ..	169·9	·97	178·6	1·25	167·9	·79	241·1	2·23	226·6	2·11	147·0	1·92	273·4	1·51	173·7	·81
2	Enthetic „ ..	305·8	·54	257·7	·10	313·1	·10	300·2	..	300·7	..	368·1	..	259·0	..	250·9	·12
3	Dietic „ ..	13·2	..	7·8	·10	6·4	..	6·7	·32	9·0	..	6·0	..	13·3	·16	11·0	·23
4	Parasitic „ ..	37·6	..	39·7	..	31·7	..	97·7	..	42·3	..	10·2	..	53·7	..	29·6	..
	Class II.																
1	Diathetic Diseases ..	3·9	·32	4·6	..	3·9	·10	4·8	..	5·4	·18	4·1	·21	3·0	..	4·9	..
2	Tubercular „ ..	14·6	2·47	21·0	3·23	17·9	1·98	11·5	2·56	18·4	1·93	16·6	2·34	13·6	2·43	14·0	2·43
	Class III. Diseases of the—																
1	Nervous System ..	17·4	1·61	21·3	·73	19·7	·54	15·0	·32	10·9	·35	15·3	·85	26·6	·50	18·4	1·15
2	Circulatory „ ..	9·0	1·18	8·3	1·35	9·3	·94	7·0	1·28	7·9	·53	10·7	·85	9·4	1·26	5·0	1·04
3	Respiratory „ ..	91·1	1·40	98·3	1·15	85·5	1·34	83·0	·32	121·9	1·76	77·1	1·07	85·1	1·00	83·3	1·51
4	Digestive „ ..	38·5	1·18	35·3	·83	34·6	·59	48·6	·63	43·4	·18	32·6	·43	45·3	·59	30·6	·35
5	Urinary „ ..	3·8	·32	2·4	·21	2·9	·10	3·2	·32	1·9	..	3·0	·21	4·0	..	1·8	..
6	Reproductive „ ..	12·1	..	11·2	..	15·3	..	11·5	..	7·9	..	13·4	..	10·5	..	14·9	..
7	Locomotive „ ..	4·4	..	5·6	..	4·1	·05	5·1	..	1·9	..	5·5	..	7·5	..	3·1	..
8	Integumentary „ ..	119·2	·11	127·1	·10	138·4	..	210·5	..	124·7	..	118·0	..	167·8	..	129·6	..
	Class IV.																
4	Diseases of Nutrition ..	1·8	..	3·2	..	1·9	..	3·8	..	2·1	..	1·3	..	3·4	..	1·3	·12
	Class V.																
1	Accidents	89·0	1·07	88·0	·21	95·5	·29	107·0	..	76·4	·87	74·6	·64	102·2	·25	110·7	1·27
3	Homicide	..	..	..	..	..	10	..	..	..	..	..	·21	..	..	..	..
4	Suicide	..	·32	·1	·10	·2	·35	·7	·64	..	·35	..	·21	·1	·16	·3	·23
5	Corporal Punishment ..	·8	..	·3	..	1·3	..	5·8	..	1·6	..	3·4	..	2·3	..	1·4	..
	Diseases not specified ..	·3	..	·1	..	·2	..	·3	..	·3	..	..	..	·4	..	..	..
	Total	932·4	11·49	910·6	9·36	949·8	7·27	1163·5	8·62	1003·3	8·26	906·9	8·94	1080·6	7·86	884·5	9·26

United Kingdom.

MIASMATIC DISEASES.—Compared with the results of 1863 there has been a decrease in the prevalence of these diseases in the Seaport Towns and the Dockyards and Arsenals, a marked increase in the large Manufacturing Towns, Depôt Battalion Stations, and in London and Windsor, and a scarcely appreciable increase in Dublin, at the Camps, and at the "remaining Stations." The influence of the principal diseases comprised in this class has been as follows, at each of the groups of Stations:—

		Annual Ratio per 1,000 of Mean Strength.							
		Seaport Towns.	Dockyards and Arsenals.	Camps.	Manufacturing Towns.	London and Windsor	Dublin.	Depôt Battalion Stations.	Remaining Stations.
Eruptive Fevers ..	Admitted	5·8	2·5	3·1	5·7	9·7	·6	3·0	2·9
	Died ..	·22	·10	·05	·64	·35	..	·08	·12
Paroxysmal Fevers ..	Admitted	11·6	12·9	5·7	2·6	·7	1·9	7·9	6·1
	Died ..	..	·21	·10	..	..	..	·08	..
Continued Fevers ..	Admitted	17·6	18·1	19·7	52·2	31·3	14·7	45·8	19·1
	Died ..	·32	·52	·25	·64	·88	·85	·92	·34
Dysentery, Diarrhœa, and Cholera	Admitted	20·6	18·9	13·5	22·0	31·1	10·2	18·4	13·8
	Died ..	·82	·31	·25	..	..	·21	·08	·23
Sorethroat and Influenza	Admitted	34·3	45·9	39·7	107·9	78·9	53·5	83·2	43·3
	Died ..	..	·10	·05	..	..	..	·17	·12
Ophthalmia	Admitted	20·6	18·6	20·6	19·8	8·2	16·0	42·1	18·5
	Died ..	..	..	..	..	..	..	..	..
Rheumatism	Admitted	41·2	38·6	55·5	34·5	43·6	34·3	46·4	52·0
	Died ..	..	..	·10	..	·18	..	..	..

Eruptive Fevers.—The highest proportion of cases occurred in London and Windsor and the lowest in Dublin. The admissions were above the average also in the Seaport and large Manufacturing Towns. Of 277 cases of Eruptive Fevers 111 were Small-pox, 89 Scarlet Fever, 55 Measles, and 22 Chicken Pox. There were ten deaths by Small-pox, but as three occurred among men on furlough who were not admitted into military hospitals, the proportion of deaths to treated was 7 in 111 or 6·4 per cent. The greatest number of cases occurred at Portsmouth, and next to it were Colchester and London. Considering that Small-pox and Scarlet Fever were very prevalent among the civil population over the country generally, the troops appear to have suffered but little.

Continued Fevers were very much more prevalent than in 1863 among the troops in the large Manufacturing Towns and at the Depôt Battalion Stations. In the former, fevers were most prevalent at Preston during the second quarter, and at Glasgow and Paisley during the third and fourth quarters of the year, but they were not of a fatal type. Of the Depôt Battalion Stations, Fermoy furnished much the largest number of cases, 164 admissions having taken place in a strength of 1,425 men—90 of these occurred in the third quarter of the year. The great prevalence of fever was attributed by the Surgeon to the exposure of the men, while at drill, to the heat of the sun, which especially in July was greatly above the average; although a source of so much inefficiency the fever did not in any instance terminate fatally; the admissions by fever were also numerous in Templemore, Birr, and Stirling.

Dysentery and Diarrhœa were considerably above the average of the previous year in the large Manufacturing Towns and in London and Windsor. In the former the admissions were chiefly in December, and were most numerous at Sheffield and Preston in the third quarter of the year; in

London and Windsor the cases were exclusively diarrhœa; among the Household Cavalry they occurred chiefly in the third quarter, among the Foot Guards in the third and first quarters, while the Line Regiment was almost completely exempt from them. *United Kingdom.*

Sore throat and Influenza were considerably in excess among the troops in the large Manufacturing Towns, in London and Windsor, and at the Stations of the Depôt Battalions; their prevalence, as might have been expected, was most marked in the first and fourth quarters of the year. Influenza did not occur in the form of a general epidemic.

ENTHETIC DISEASES.—Although still a source of great inefficiency, these continue to show a reduction—the ratio of admissions having been 50 per 1,000 under the average of the four preceding years, and 16 per 1,000 under that of 1863. The reduction has extended to all the groups of Stations except the Camps, the Manufacturing Towns, and London and Windsor, at which there has been a very slight increase.

The following Table shows the prevalence of venereal in 1863 and 1864 respectively, at the different stations where large numbers of the troops are quartered:—

	Ratio per 1,000 of Mean Strength.				Ratio per 1,000 of Mean Strength.	
	1864.	1863.			1864.	1863.
Colchester	371	396	Cork		253	294
Dublin	368	396	Shorncliffe		249	248
Portsmouth	337	349	Dover		247	313
Aldershot	321	303	Woolwich		220	292
Manchester	314	330	Edinburgh		200	305
Chatham	313	322	Fermoy		146	212
Canterbury	310	435	London and Windsor	Household Cavalry ..	139	143
The Curragh	303	308		Foot Guards	314	348
Devonport and Plymouth ..	289	351		Line Regiment ..	366	250
Isle of Wight	288	246				

There has been a decrease at all the stations except Aldershot, the Isle of Wight, and in the Line Regiment quartered in London; it has been most marked at Canterbury and Edinburgh.

This class of diseases still proves a cause of much inefficiency, the mean daily sick from it having in 1864 amounted to 1399·2 men, or 19·10 per 1,000 of the strength. The loss of service caused by venereal therefore has been equal to that of the whole force serving in the United Kingdom for seven days, and the average stay of the cases in hospital has been 24 days. On dividing the cases into two groups, the first including all primary sores, buboes, and secondary affections, and the second, gonorrhœa, phymosis, swelled testicle, and stricture, the following results are obtained:—

1864.	Admissions into Hospital.	Average constantly Sick.	Ratio per 1,000		Loss of Service to whole Force.	Duration of Cases in Hospital.
			Admitted.	Constantly Sick.		
					Days.	
Syphilitic group ..	12,343	965·6	168·5	13·18	4·81	28·55
Gonorrhœal group.	8,953	433·6	122·2	5·92	2·17	17·68

On comparing this with a similar Table in the Report for 1861 it will be found that there has been a considerable reduction in the admissions and number constantly sick in both groups, though most marked in the syphilitic,

United Kingdom.

but there has been a slight increase in the duration of cases in it and a decrease to the extent of nearly a day and a-half in the gonorrhœal group.

Diseases of the Respiratory System were much in excess of the average among the Foot Guards in London and Windsor; compared with the results of 1863 these diseases showed an increase also at the Seaport Towns and the Camps, but were not above the general average.

Diseases of the Integumentary System were extremely prevalent among the troops in the large Manufacturing Towns and the Depôt Battalions; in the former the stations at which this was most marked were Preston, Sheffield, and Birmingham, at the first, from eczema, boils, and ulcers, and at the others from boils and ulcers. At the Depôt Battalions the excess was due principally to boils, abcesses, and ulcers, which were probably the result of the change in the habits and mode of living of the recruits.

Accidental and Violent Deaths furnished almost exactly the average proportion. Drowning still holds a prominent place among the causes of these. Twenty-four deaths were returned as suicidal; the means by which they were effected were, in 10 instances by firearms, in 6 by cutting throat, in 4 by poison, in 3 by hanging, and in 1 by the man placing himself in the way of a railway train. The poison taken was in one instance opium, and in the other three instances cyanide of potassium, which is used for cleaning the arms.

In preparing a statement of sickness, mortality, and invaliding by arms of the service, we have as in former Reports included only such corps as have served during the whole year in the United Kingdom; and have also, for reasons formerly stated, confined the information respecting the Royal Engineers to the deaths, and the Coast Brigade, Royal Artillery, to the deaths and invaliding.

The following Table gives the usual information respecting the different arms :—

	Average Strength.	Admitted into Hospital.	Died in and out of Hospital.	Discharged as Invalids.	Annual Ratio per 1,000 of Strength.			1859-63. Annual Ratio per 1,000.		1860-3. Ratio per 1,000.
					Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Household Cavalry	1,216	845	4	20	695	3·29	16·45	568	8·19	12·90
Dragoon Guards & Dragoons ..	8,586	7,868	66	304	916	7·69	35·41	957	6·17	30·92
Royal Artillery*..	7,440	7,519	60	*	1,011	8·05	*	1,052	6·98	..
Royal Engineers..	2,489	..	14	..	..	5·61	..	..	7·63	..
Military Train ..	1,184	1,030	11	20	908	9·70	17·64	1,095	6·13	29·76
Foot Guards ..	4,192	4,442	44	155	1,060	10·50	36·98	827	9·28	29·89
Infantry Regts. ..	20,748	16,599	182	683	800	8·77	32·92	866	7·90	28·74
Cavalry Depôts ..	1,025	1,098	12	12	1,071	11·71	11·71	1,274	9·74	46·94
Depôt Brig., R.A.*	3,213	2,966	35	346	923	10·89	32·50	1,229	11·27	24·51
Coast Brig., R.A..	1,440	..	28	15	..	19·44	10·48	..	18·84	7·97
Depôt Battalions.	15,599	15,796	155	516	1,013	9·94	33·09	1,023	12·56	47·00

There has been a marked increase in the admissions, compared with the results of 1863, in the Household Cavalry, Royal Artillery, Foot Guards, and Depôt Battalions; and a decrease in the Military Train, the Cavalry Depôts, and the Depôt Brigade Royal Artillery; while in the Cavalry of the Line and

* It has been deemed necessary, as in former Reports, to include the invalids of the Depôt Brigade with those of the other Brigades of the Royal Artillery. The ratio per 1,000 is therefore calculated upon 10,653, the average strength of the corps serving at home, exclusive of the Coast Brigade.

Infantry Regiments there has been almost no change. The admissions have, however, been under the average of the five preceding years in all of them but the Household Cavalry and the Foot Guards. *United Kingdom.*

The mortality has been higher than in 1863 in all the arms except the Household Cavalry, the Royal Engineers, and the Depôt Battalions; and it has been above the average of the five preceding years in all, with the same exceptions, and the Depôt Brigade Royal Artillery. It would appear, therefore, that the cause of the increased mortality has been general, for the small numbers of the Household Cavalry and Royal Engineers might render their exemption an accidental occurrence; while the mortality of the Depôt Battalions is liable, as frequently pointed out in former Reports, to be considerably affected by the numbers joining from the service companies with constitutions impaired by tropical service. The increase cannot be attributable to the influence of invaliding, as the proportion thus discharged in 1864 was above the average in all the arms except the Military Train, Cavalry Depôts, and Depôt Battalions.

It is perhaps scarcely necessary to repeat that the high rate of mortality and low rate of invaliding in the Coast Brigade Royal Artillery are due to the constitution of the corps, the great majority of the men being old soldiers and many of them labouring under affections resulting from previous service, which, though not sufficient to disable them for garrison duty at home, render them unfit for the active work required of artillery men and for colonial service. A large proportion of them is thus enabled to complete the period which entitles them to pensions for length of service, without any special cause of disability being assigned for their discharge.

The following Table shows the number of men placed on the pension list from the various corps included in the preceding Tables, and of the deaths which occurred among them up to the 31st of December :—

	Placed on the Pension List during the Year 1864.	Of whom there Died before 31st December, 1864.
Household Cavalry	42	1
Dragoon Guards and Dragoons ..	336	12
Royal Artillery	313	16
Military Train	21	1
Foot Guards	195	12
Infantry Regiments and their Depots	1,092	34

On adding these deaths to the numbers already recorded, and correcting the strength by the addition of half the numbers placed on the pension list, on the principles explained in previous Reports, the following results are obtained :—

	1864.			1860-63.
	Average Strength corrected as above.	Deaths of Soldiers and Pensioners.	Ratio of Deaths per 1,000 of Strength.	Ratio of Deaths of Soldiers and Pensioners per 1,000 of Strength.
Household Cavalry	1,237	6	4·85	9·46
Cavalry of the Line	8,754	78	8·91	6·95
Royal Artillery	7,597	76	10·00	7·12
Military Train	1,145	12	10·48	6·37
Foot Guards	4,290	56	13·05	11·66
Infantry Regiments and their Depôts	24,329	237	9·74	9·28

United Kingdom.

With the exception of the Household Cavalry all the arms have experienced a higher rate of mortality than on the average of the four preceding years, a result in accordance with the high ratio which prevailed among the civil population. The increase was less marked in the Infantry Regiments than in any of the other arms.

The diseases by which the admissions into hospital, deaths, and discharges by invaliding were caused, are stated in detail in Abstract No. 1 of Appendix.

The results are shown in the following Tables :—

Orders.		Household Cavalry.			Dragoon Guards and Dragoons.			Royal Artillery.			Military Train.			Foot Guards.			Infantry Regiments.			Cavalry Depôts.			Depôt Brigade Royal Artillery.			Infantry Depôt Battalions.			Royal Engineers.	Coast Brigade, R. A.	
	Strength	1,216			8,586			7,440			1,134			4,192			20,748			1,025			3,213			15,599			2,489	1,440	
		Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Died.	Died.	Invalided.
	Class I.																													
1	Miasmatic Diseases ..	213	2	1	1,437	8	35	8	6	26	180	..	..	1,026	12	4	3,107	30	82	295	2	1	577	5	4	3,670	21	66	2	2	1
2	Enthetic „ ..	172	..	..	2,354	1	23	2,202	1	18	377	..	2	1,419	..	10	5,206	6	33	261	..	2	819	..	4	4,122	2	24	..	..	1
3	Dietic „ ..	2	..	..	37	..	..	149	..	1	11	..	..	43	..	..	132	3	1	10	1	..	20	1	..	147	1	..	..	..	..
4	Parasitic „ ..	16	..	..	224	..	..	182	..	..	47	..	..	216	..	..	664	..	..	48	..	..	176	..	..	995	..	1	..	..	..
	Class II.																													
1	Diathetic Diseases ..	19	..	..	29	2	..	47	..	3	2	..	..	17	..	..	73	1	7	1	..	..	18	..	..	39	..	..	..	..	..
2	Tubercular „ ..	10	..	13	94	16	52	131	14	53	11	4	3	94	11	64	351	42	171	11	4	1	38	16	10	271	57	130	8	11	5
	Class III. Diseases of the—																													
1	Nervous System ..	9	..	2	136	5	42	177	6	38	24	..	..	49	4	10	311	21	67	46	1	4	56	3	15	388	17	87	..	2	4
2	Circulatory „ ..	5	..	2	60	10	37	74	12	32	8	2	6	38	2	16	166	20	138	5	1	2	22	3	9	141	14	59	1	4	1
3	Respiratory „ ..	92	1	..	659	12	19	688	5	28	117	2	3	549	9	26	1,532	28	54	43	2	..	312	3	4	1,235	18	33	2	4	1
4	Digestive „ ..	62	..	..	212	3	37	315	6	31	43	2	3	157	1	4	713	14	57	53	..	2	127	2	9	597	11	40	..	1	..
5	Urinary „ ..	3	..	..	13	..	1	27	2	4	1	..	..	7	..	4	59	3	8	5	..	..	7	..	1	65	3	7	..	1	1
6	Reproductive „ ..	10	..	..	159	..	10	116	..	6	4	..	1	25	..	4	242	..	4	19	..	..	40	..	1	136	..	5	..	..	..
7	Locomotive „ ..	1	..	..	33	..	11	43	1	9	1	..	..	9	..	4	69	..	16	2	..	..	14	..	4	95	..	13	..	..	..
8	Integumentary „ ..	121	..	..	1,428	..	15	1,018	..	11	88	..	..	517	..	6	2,389	..	16	197	..	..	430	..	4	2,476	1	21	..	..	..
	Class IV.																													
4	Diseases of Nutrition.	..	..	1	7	..	2	6	1	2	1	..	..	3	..	..	44	..	15	2	..	..	23	..	1	56	..	15	..	..	..
	Class V.																													
1	Accidents	110	1	1	971	3	20	853	5	15	113	..	2	262	3	3	1,496	8	14	100	1	..	285	..	3	1,322	7	9	1	3	1
3	Homicide	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
4	Suicide	..	..	..	..	6	..	..	1	..	..	1	..	..	2	..	2	5	..	..	..	..	..	2	..	2	3	1	..	..	..
5	Corporal Punishment.	..	..	..	13	..	..	13	..	..	2	..	..	9	..	..	38	..	..	..	..	..	2	..	..	33	..	..	..	..	..
	No appreciable disease	..	..	..	2	..	..	..	..	..	..	..	..	2	..	..	5	..	..	..	..	..	..	..	..	5	..	..	..	..	..
	Malingering	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	845	4	20	7,868	66	304	6,049	60	277	1,030	11	20	4,442	44	155	16,599	182	683	1,098	12	12	2,966	35	69	15,796	155	516	14	28	15

Ratio per 1,000 of Mean Strength.

Orders.		Household Cavalry.			Dragoon Guards and Dragoons.			Royal Artillery.			Military Train.			Foot Guards.			Infantry Regiments.			Cavalry Depôts.			Depôt Brigade Royal Artillery.			Infantry. Depôt Battalions.			Royal Engineers.	Coast Brigade, R.A.	
	Strength..	1,216			8,586			7,440			1,134			4,192			20,748			1,025			3,213			15,599			2,489	1,440	
		Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Died.	Died.	Invalided.
	Class I.																													
1	Miasmatic Diseases ..	175·2	1·65	·82	167·4	·93	4·08	198·7	·81	3·50	158·7	..	..	244·8	2·86	·95	149·7	1·45	3·95	287·8	1·95	·98	179·6	1·56	1·25	235·3	1·35	4·23	·80	1·39	·70
2	Enthetic „ ..	141·5	..	..	273·6	·12	2·68	296·0	·13	2·42	332·4	..	1·76	338 5	..	2·39	250·9	·29	1·59	254·6	..	1·95	254·9	..	1·25	264·3	·13	1·54	.	..	·70
3	Dietic „ ..	1·6	..	..	4 3	..	..	20·0	..	·13	9·7	..	..	10·3	..	..	6·8	·15	·05	9·8	·98	..	6·2	·31	..	9·4	·06	..	..	..	..
4	Parasitic „ ..	13·2	..	..	26·1	..	..	24·5	..	..	41·4	..	..	51·5	..	..	32·0	..	..	46·8	..	..	54·8	..	..	63·8	..	·06	..	..	..
	Class II.																													
1	Diathetic Diseases ..	15·6	..	..	3·4	·23	..	6·3	..	·40	1·8	..	..	4·1	..	..	3·5	·05	·34	1·0	..	..	5·6	..	..	2·5	..	..	..	..	..
2	Tubercular „ ..	8·2	..	10·69	11·0	1·86	6·06	17·6	1·88	7·12	9·7	3·52	2·65	22·4	2·62	15·27	16·9	2·02	8·24	10·7	3·90	·98	11·8	4·98	3·11	17·4	3·66	8·33	3·21	7·64	3·47
	Class III. Diseases of the—																													
1	Nervous System ..	7·4	..	1·65	15·8	·58	4·89	23·8	·81	5·11	21·2	..	..	11·7	·95	2·39	15·0	1·01	3·23	44·9	·98	3·90	17·4	·93	4·67	24·9	1·09	5·58	..	1·39	2·78
2	Circulatory „ ..	4·1	..	1·65	7·0	1·17	4·30	10·0	1·61	4·30	7·1	1·76	5·29	9·1	·48	3·82	8·0	·96	6·65	4·9	·98	1·95	6·9	·93	2·80	9·0	·90	3·78	·40	2·78	·70
3	Respiratory „ ..	75·7	·82	..	76·8	1·40	2·21	92·5	·67	3·76	103·2	1·76	2·65	131·0	2·15	6·20	73·8	1·35	2·60	42·0	1·95	..	97·1	·98	1·25	79·2	1·15	2·12	·80	2·78	·70
4	Digestive „ ..	51·0	..	..	25·3	·35	4·30	42·3	·81	4·17	37·9	1·76	2·65	37·5	·24	·95	34·3	·67	2·77	51·7	..	1·95	39·5	·62	2·80	38·3	·71	2·57	..	·69	..
5	Urinary „ ..	2·5	..	..	1·5	..	·12	3·6	·27	·54	·9	..	..	1·7	..	·95	2·8	·14	·38	4·9	..	..	2·2	..	·31	4·2	·19	·45	..	·69	·70
6	Reproductive „ ..	8·2	..	..	18·5	..	1·17	15 6	..	·81	3·5	..	·88	6·0	..	·95	11·6	..	·19	18·5	..	..	12·4	..	·31	8·7	..	·32	..	..	..
7	Locomotive „ ..	·8	..	..	3·8	..	1·29	5·8	·13	1·21	·9	..	..	2·1	..	·95	3·3	..	·77	1·9	..	..	4·4	..	1·25	6·1	..	1·15	..	..	..
8	Integumentary „ ..	99·5	..	..	166·3	..	1·75	136·8	..	1·48	77·6	..	..	123·3	..	1·43	115·1	..	·77	192·2	..	..	133·8	..	1·25	158·7	·06	1·35	..	..	..
	Class IV.																													
4	Diseases of Nutrition ..	..	..	·82	·8	..	·23	·8	·13	·27	·9	..	..	·7	..	..	2·1	..	·72	1·9	·98	..	7·2	..	·31	3·6	..	·96	..	..	..
	Class V.																													
1	Accidents	90·4	·82	·82	113·1	·35	2·33	114·6	·67	2·01	99·6	..	1·76	62·5	·72	·72	72·1	·39	·67	97·6	..	..	88·7	..	·93	84·7	·45	·58	·40	2·08	·70
3	Homicide	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	·05	..	..	..	..	..	..	..	..	..	..	..	..	..
4	Suicide	..	..	..	..	·70	..	..	·13	..	..	·88	..	..	·48	..	1	·24	..	..	..	..	..	.62	..	..	.2	·19	·06	..	..	..
5	Corporal Punishment..	..	..	..	1·5	..	..	1·7	..	..	1·8	..	..	2·1	..	..	1·8	..	..	..	..	..	..	·6	..	2·1	..	..	..	..	..
	No appreciable disease..	..	..	..	·2	..	..	..	..	..	..	..	..	·4	..	..	·2	..	..	..	..	..	..	..	..	·3	..	..	..	..	..
	Malingering	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	694·9	3·29	16·45	916 4	7·69	35·41	1010·6	8·05	37·23	908·3	9·68	17·64	1059·7	10·50	36·97	800·0	8·77	32·92	1071·2	11·72	11·71	923·1	10·88	21·49	1012·7	9·94	33·08	5·61	19·44	10·45

MIASMATIC DISEASES have been more prevalent than in 1863 in the Royal Artillery and Foot Guards, and also, though to a less extent, in the Household Cavalry, Cavalry Depôts, and Depôt Battalions; they have been under the previous ratio in the Military Train, and Depôt Brigade R.A.; in the other arms the difference has been very trifling. *United Kingdom.*

The following Table shows the influence of the principal diseases comprised in this class.

		Annual Ratio per 1,000 of Mean Strength.									
		Household Cavalry.	Dragoon Guards and Dragoons.	Royal Artillery.	Military Train.	Foot Guards.	Infantry Regiments.	Cavalry Depôts.	Depôt Brigade, Royal Artillery.	Depôt Battalions.
Eruptive Fevers ..	Admitted..	9·87	2·56	3·32	2·65	9·54	2·84	·98	2·18	4·23
	Died ..	·82	..	·27	..	·48	·24	..	·31	·13
Paroxysmal Fevers ..	Admitted..	·82	1·75	8·47	..	·95	4·48	1·95	15·25	6·47
	Died ..	..	..	..	..	..	·05	..	·62	·06
Continued Fevers ..	Admitted..	14·80	20·38	21·10	19·40	36·74	19·52	17·56	14·63	39·62
	Died ..	·82	·36	·40	..	1·19	·53	1·95	·62	·77
Dysentery, Diarrhœa, and Cholera	Admitted..	23·85	15·72	27·56	15·87	35·78	13·11	20·48	18·36	13·98
	Died ..	..	·12	..	..	..	·19	..	..	·13
Sorethroat and Influenza	Admitted..	55·10	49·50	51·61	40·56	85·88	38·41	125·85	57·27	68·79
	Died ..	..	·12	·13	..	..	·10	..	..	·13
Ophthalmia	Admitted..	4·11	12·46	16·67	9·70	8·82	20·24	26·34	15·25	37·70
	Died ..	..	..	..	..	..	..	..	..	..
Rheumatism	Admitted..	39·47	50·43	48·25	58·20	45·09	40·30	60·49	25·21	43·72
	Died ..	..	·12	..	..	·24	..	..	..	..

United Kingdom.

Eruptive Fevers, although less prevalent than in 1863, have given rise to a high proportion of admissions in the Household Cavalry and Foot Guards, and also in the Depôt Battalions. In the first it was caused by small-pox and chicken pox in the 1st Life Guards stationed in London; in the Foot Guards, by measles in the 3rd Battalion Grenadiers, and 1st Battalion Coldstreams, and by measles and scarlet fever in the 1st Battalion Scots Fusilier Guards. In the Depôt Battalions the excess was chiefly due to small-pox in the 10th Battalion at Colchester, and small-pox and measles in the 14th at Belfast, but in none of these could the diseases be said to prevail epidemically.

Paroxysmal Fevers.—The high ratio of admissions by these in the Depôt Brigade R.A., and Depôt Battalions was due to the large proportion of men in them who during their previous tropical service had contracted a liability to that form of fever. In the Royal Artillery the ratio was much above the average by the occurrence of a number of cases of intermittent fever in the 13th Brigade which returned from India in 1862.

Continued Fevers were less prevalent than in 1863 in the Foot Guards, Cavalry Depôts, and Depôt Brigade Royal Artillery; in all the other arms there was an increase in the admissions but to no marked extent, except in the Depôt Battalions in which it amounted to 12 per 1,000. The 19th at Fermoy was the Battalion which furnished much the largest proportion, the cases in it having amounted to 142 per 1,000 of the strength. As already stated the Surgeon attributed the great prevalence of fever to the exposure of the men, while at drill, to the heat of the sun; the admissions from the same cause in the 18th Battalion also at Fermoy amounted to 53 per 1,000.

Dysentery and Diarrhœa were more prevalent than in the preceding year in the Household Cavalry, Royal Artillery, Foot Guards, and Depôt Brigade R.A.; the Foot Guards furnished a much larger proportion of cases than any of the other arms, the admissions being chiefly from the 3rd Battalion Grenadier Guards and the 1st Battalion Scots Fusilier Guards, and attributed by the Medical Officers to the excessive heat of the summer.

Sorethroat (Tonsillitis) *and Influenza* have been more prevalent than in 1863, in all the arms except the Household Cavalry and Depôt Brigade Royal Artillery; but the increase has been greatest in the Cavalry Depôts and the Foot Guards. We have in former Reports pointed out the necessity of including *bronchitis* with these diseases, in any statement of their relative frequency in the different arms of the service. This has been done in the following Table, and the average of the four preceding years is added for the purpose of comparison :—

Ratio of Admissions per 1,000 of Mean Strength by *Tonsillitis, Influenza*, and *Acute Bronchitis*.

	Household Cavalry.	Dragoon Guards and Dragoons.	Royal Artillery.	Military Train.	Foot Guards.	Infantry Regiments.	Cavalry Depôts.	Depôt Brigade Royal Artillery.	Infantry Depôts.
1864	126	105	116	111	190	85	144	167	120
1860–63 . ..	88	99	96	117	115	90	165	171	147

This shows a marked excess of admissions, compared with the average of the four preceding years, in the Foot Guards and Household Cavalry, and an excess also in the Royal Artillery and Cavalry of the Line, but a decrease in all the other arms. We are unable to assign any special reason for the great increase in the Household Troops. The high proportion in the Cavalry, Artillery, and Infantry Depôts is doubtless due to the large number of recruits in them—men recently taken from civil life, necessarily exposed a good deal in the course of their drill, and as yet unused to the means of protecting themselves, which soldiers gradually acquire in the course of their service.

ENTHETIC DISEASES.—Venereal disease has given rise to fewer admissions in

all arms except the Household Cavalry, Foot Guards, and Depôt Battalions, in which there has been a trifling increase. The improvement has been most marked in the Cavalry Depôts, the Depôt Brigade Royal Artillery, and the Military Train. *United King*

TUBERCULAR DISEASES.—The total loss by death and invaliding, in each arm of the service in 1863, compared with the average of the four preceding years, is shown in the following Table :—

Ratio of Decrease per 1,000 of Mean Strength by Deaths and Invaliding from Tubercular Diseases.

	1864.			Average of 1860–63.		
	By Deaths.	By Invaliding.	By Deaths and Invaliding.	By Deaths.	By Invaliding.	By Deaths and Invaliding.
Household Cavalry ..	...	10·69	10·69	3·07	5·95	9·02
Cavalry of the Line ..	1·86	6·06	7·92	2·19	6·79	8·98
Royal Artillery*.. ..	1·88	5·91	7·79	2·43	6·64	9·07
Military Train	3·52	2·65	6·17	2·38	6·97	9·35
Foot Guards	2·62	15·27	17·89	4·09	13·43	17·52
Infantry Regiments ..	2·02	8·24	10·26	2·66	5·88	8·54
Cavalry Depôts	3·90	·98	4·88	2·70	4·18	6·88
Depôt Brigade, R.A.* ..	4·98	5·91	10·89	5·90	6·64	12·34
Depôt Battalions ..	3·66	8·33	11·99	4·80	8·65	13·45

This Table shows a reduction in the loss by this class of diseases in all the arms except the Household Cavalry and the Infantry Regiments. It has taken place both in the deaths and invaliding, and may probably be attributable in some degree, at least, to the introduction of the present system of invaliding.

Although there is a reduction in the mortality in the Foot Guards, compared with the average of the four preceding years, this is compensated by an increase in the invaliding, and the total loss is considerably above that in any of the other arms.

VIOLENT DEATHS :—The suicidal deaths were distributed as follows :—6 in the Cavalry, 5 in the Infantry Regiments, 3 in the Depôt Battalions, 2 in the Depôt Brigade Royal Artillery, 2 in the Foot Guards, 1 in the Royal Artillery, and 1 in the Military Train. Among the accidental deaths are included those of a private of the Coldstream Guards who was shot at Wimbledon while acting as marker at the Rifle Butts ; of a gunner of the Royal Artillery, at Devonport, who was poisoned by eating mussels ; and of a private of the 19th Hussars, who was killed at Guildford, in attempting to enter a railway carriage while the train was in motion.

The admissions, deaths, and discharges by invaliding in each of the Corps included in these Returns, are shown in the following Table :—

* In consequence of the impossibility of separating the invalids of the Depôt Brigade from those of the other brigades serving at home, we have been obliged to assume that the proportion discharged as invalids has been the same in each. The ratio has been calculated, as already stated, on the aggregate strength of the Artillery serving in the United Kingdom, exclusive of the Coast Brigade.

United Kingdom.

Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Died.	Invalided.	Stations.
										months.
1st Life Gds.	408	265	1	..	1	11	649·5	2·45	26·96	Regent's Pk. 3 Hyde Park 9
2nd Life Gds.	405	266	..	2	2	8	656·8	4·94	19·75	Hyde Park 3 Windsor 8 Aldershot 1
R. Horse Gds.	403	314	..	1	1	1	779·1	2·48	2·48	Windsor 3 Regent's Pk. 9
	1,216	845	1	3	4	20	694·9	3·29	16·45	
4th Dr. Gds.	567	481	4	..	4	22	848·3	7·05	38·80	Dundalk, &c. 5½ Dublin 1 Curragh & Newbridge 5½
5th „	587	505	..	..	..	11	860·3	..	18·74	Cahir, &c. 6½ Curragh Newbridge & Dublin 5½
6th „	560	469	3	..	3	26	837·5	5·36	46·42	Aldershot 7⅓ Brighton & Shorncliffe 4⅓
1st Dragoons	570	455	7	..	7	38	798·3	12·28	66·67	Aldershot 12
2nd „	570	719	5	2	7	19	1261·4	12·28	33·33	Birming., &c. 5⅓ Aldershot 6⅔
3rd Hussars	585	651	1	1	2	19	1115·4	3·42	32·48	Edinbrgh.,&c. 4 Manchstr.,&c. 8
4th „	566	245	..	2	2	21	432·9	3·53	37·10	Dublin 5½ Curragh 1 Dundalk, &c. 5½
9th Lancers	565	341	2	..	2	29	603·5	3·54	51·33	Brighton 3 On the march 1 Newbridge 4 Dublin 4
10th Hussars	571	575	2	2	4	16	1007·0	7·01	28·02	Dublin 5½ Curragh 1 Cahir, &c. 5½
11th „	573	530	3	1	4	20	925·0	6·98	34·90	Dublin, &c. 5½ Newbridge 2 Dublin 4½
12th Lancers	569	482	9	1	10	9	858·8	17·57	15·82	Hounslow,&c. 7⅓ Sheffield, &c. 4⅔
13th Hussars	578	507	3	3	6	19	877·2	10·38	32·87	Aldershot 7⅓ Hounslow,&c. 4⅔
14th „	579	563	3	1	4	18	972·4	6·91	31·08	Manchstr.,&c. 4 Aldershot 8
15th „	579	811	5	..	5	20	1400·7	8·63	34·54	Newbridge 3½ On the march 1 Edinbrgh.,&c. 7½
16th Lancers	567	534	4	2	6	17	941·8	10·58	29·98	York 5 Colchestr.,&c. 7
	8,586	7,868	51	15	66	304	916·4	7·69	35·41	

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Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Annual Ratio per 1,000. Died.	Annual Ratio per 1,000. Invalided.	Stations.	months.
Rl. Artillery:											
A Bat. A Brg. R. Horse	191	158	..	..	..	6	827·2	..	31·41	Dublin	5½
										Curragh & Newbridge	6½
B Bat. A Brg. R. Horse	180	191	2	..	2	1	1061·1	11·11	5·55	Dorchester	7½
										Woolwich	4½
Riding Establishment	207	263	1	..	1	6	1270·5	4·82	28·97	Woolwich	12
4th Brigade.	612	716	6	1	7	20	1170·0	11·44	32·68	Aldershot	8
										Woolwich	4
										Det. at Hilsea	12
5th „	864	749	3	1	4	22	866·9	4·63	25·46	Plymouth and Pembroke Dock	12
6th „	870	1,012	6	2	8	67	1163·3	9·20	77·02	Portsmh. & Chan. Isles	12
7th „	855	680	6	5	11	48	795·3	12·87	56·14	Portsmh. & I. of Wight	12
8th „	1,317	1,548	9	1	10	26	1175·4	7·59	19·74	Dublin, &c.	12
9th „	1,467	1,441	5	2	7	53	982·3	4·77	36·12	Leith Fort, Hilsea, Chatham, Shorncliffe, Aldershot	12
13th „	877	761	9	1	10	28	869·7	11·40	31·92	Woolwich, Dover & Shoebynss.	12
	7,440	7,519	47	13	60	277	1010·6	8·06	37·23		
Military Train											
1st Battalion	284	224	4	..	4	2	788·7	14·09	7·04	Woolwich	12
2nd „	284	217	..	..	..	1	764·1	..	3·52	Aldershot	12
5th „	282	315	1	1	2	11	1117·0	7·09	39·00	Aldershot	12
6th „	284	274	4	1	5	6	964·8	17·60	21·12	Curragh & Dublin	12
	1,134	1,030	9	2	11	20	908·3	9·70	17·64		
Gren. Gds., 2nd Bat. ..	864	936	5	5	10	33	1083·4	11·57	38·20	London	8½
										Shorncliffe	4½
3rd Bat. ..	867	1,144	10	1	11	30	1319·5	12·69	34·60	Windsor	3
										London	8
										Aldershot	1
Coldm. Gds., 1st Bat. ..	743	756	2	3	5	30	1017·5	6·73	40·38	London	12
2nd Bat. ..	845	632	7	1	8	22	747·9	11·92	26·04	London	7½
										Aldershot	1
										Windsor	3½
Scots F. Gds., 1st Bat. ..	873	974	9	1	10	40	1115·7	11·45	45·82	London	6
										Windsor	6
	4,192	4,442	33	11	44	155	1059·6	10·50	36·98		

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Regiments, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Died.	Invalided.	Stations.	months.
1st Foot, 2nd Bat.	751	527	5	1	6	18	701·7	7·99	23·97	Portsmouth	7
										Chan. Isles	5
2nd Foot, 1st Bat.	721	579	4	2	6	16	803·1	8·32	22·19	Devonport	12
3rd Foot, 1st Bat.	736	568	4	5	9	13	771·7	12·23	17·66	Aldershot	6¾
										Sheffield & Weedon	5¼
5th Foot, 1st Bat.	753	382	6	..	6	16	507·3	7·97	21·25	Shorncliffe	5
										Tower	3½
										Woolwich	3½
6th Foot, 1st Bat.	748	714	8	1	9	15	954·6	12·03	20·05	Aldershot	9
										Devonport	3
8th Foot, 1st Bat.	769	654	5	2	7	26	850·5	9·10	33·81	Sheffield & Weedon	6¾
										Manchester & Chester	5¼
24th Foot, 1st Bat.	742	643	..	2	2	29	866·6	2·69	39·08	Aldershot	4
										Shorncliffe	8
26th Foot ..	732	533	6	1	7	38	728·1	9·56	52·15	Portsmouth	12
29th „ ..	739	499	4	1	5	14	675.2	6.77	18·95	Dublin	4½
										Curragh	4
										Newry and Enniskillen	3½
31st „ ..	729	645	8	..	8	23	884·8	10·97	31·55	Devonport	9
										Aldershot	3
32nd „ ..	749	551	4	..	4	20	735·6	5·34	26·70	Dublin	5
										Curragh	4
										Waterford &c.	3
37th „ ..	727	505	10	..	10	17	694·6	13·75	23·38	Aldershot	7
										Dover	5
41st „ ..	746	691	9	..	9	41	926·3	12·07	54·96	Glasgow, &c.	4½
										Curragh	3
										Dublin	4½
49th „ ..	751	538	4	..	4	19	716·4	5·33	25·30	Manchester	6¾
										Dublin	5¼
53rd „ ..	731	727	8	1	9	49	994·5	12·31	67·03	Portsmouth	7½
										Curragh	4½
59th „ ..	751	644	4	1	5	41	857·5	6·66	54·59	Aldershot	12
60th Foot, 1st Bat.	740	579	6	1	7	23	782·4	9·46	31·08	Tower	5
										Curragh	4
										Dublin	3
60th Foot, 2nd Bat.	732	528	..	2	2	25	721·3	2·73	34·15	Aldershot	12
61st Foot ..	740	696	10	1	11	21	962·4	14·87	28·38	Chan. Isles	7½
										Curragh	5½
64th „ ..	756	507	7	3	10	22	670·6	13·23	29·10	Portsmth., &c.	12
73rd „ ..	737	415	2	..	2	18	563·1	2·72	24·42	Aldershot	9
										Shorncliffe	3
75th „ ..	732	830	6	2	8	49	1133·9	10·93	66·94	Aldershot	12
78th „ ..	770	534	3	..	3	12	693·5	3·90	15·59	Dover	7
										Dublin	5
83rd „ ..	741	583	4	1	5	17	786·8	6·75	22·94	Shorncliffe	4
										Aldershot	8
84th „ ..	748	630	5	..	5	17	844·2	6·68	22·73	Curragh	6½
										Dublin	4½
										Belfast	1
85th „ ..	697	831	..	2	2	24	1192·3	2·87	34·43	Dover and Shorncliffe	9
										Aldershot	3

Regiments, Depôt Battalions, &c.	Strength.	Admitted into Hospital.	Died. In Hospital.	Died. Out of Hospital.	Total Deaths.	Discharged as Invalids.	Annual Ratio per 1,000. Admitted.	Died.	Invalided.	Stations.
										months.
87th Foot ..	738	543	11	1	12	49	735·8	16·26	66·40	Aldershot 6½; Gosport, &c. 5½
92nd „ ..	742	523	7	2	9	11	704·9	12·13	14·83	Edinburgh, &c. 6; Glasgow, &c. 6
	20,748	16,599	150	32	182	683	799·8	8·77	32·92	
Cavalry Deps:										
Canterbury	757	817	7	1	8	5	1079·3	10·57	6·61	
Maidstone.	268	281	3	1	4	7	1048·5	14·92	26·12	
	1,025	1,098	10	2	12	12	1071·2	11·71	11·71	
R.A. Dep. Bde.										
R.H.A. ..	456	518	1	..	1	17	1136·0	2·19	37·28	Canterbury 12
1st Div., D.B.	509	693	5	1	6	18	1361·5	11·79	35·36	Sheerness 12
2nd „ „	1,046	902	4	..	4	12	862·3	3·91	11·47	Woolwich 12
3rd „ „	584	581	4	..	4	4	994·9	6·85	6·85	Warley 12
4th „ „	618	272	15	5	20	18	440·1	32·36	29·12	Woolwich 12
	3,213	2,966	29	6	35	69	923·1	10·89	21·47	
1st Dep. Bat.	787	695	12	1	13	15	884·3	16·52	19·06	Chatham
2nd „ ..	919	775	7	2	9	32	841·1	9·79	34·82	Chatham
3rd „ ..	649	806	2	..	2	27	1241·9	3·08	41·60	Chatham
4th „ ..	795	821	7	2	9	28	1032·7	11·32	35·22	Colchester
5th „ ..	905	779	7	1	8	24	860·8	8·84	26·52	Parkhurst
6th „ ..	533	522	2	..	2	14	979·4	3·75	26·27	Walmer
7th „ ..	733	959	8	2	10	16	1308·3	13·64	21·83	Winchester
8th „ ..	650	760	5	2	7	17	1169·3	10·77	26·15	Pembroke Dock
9th „ ..	724	552	4	1	5	25	762·4	6·91	34·53	Colchester
10th „ ..	672	585	11	..	11	20	870·5	16·37	29·76	Colchester
11th „ ..	938	1,362	6	2	8	21	1452·0	8·53	22·39	Preston
12th „ ..	677	677	6	1	7	36	1000·0	10·34	53·18	Athlone
13th „ ..	920	822	5	2	7	36	893·5	7·61	39·13	Birr
14th „ ..	678	635	6	3	9	31	936·7	13·28	45·72	Belfast
15th „ ..	438	434	4	..	4	3	990·9	9·13	6·85	Buttevant
16th „ ..	588	534	4	4	8	18	908·4	13·59	30·61	Templemore
17th „ ..	575	725	5	1	6	19	1260·9	10·44	33·04	Limerick
18th „ ..	751	600	3	2	5	32	798·9	6·66	42·61	Fermoy
19th „ ..	856	967	5	2	7	25	1129·7	8·18	29·21	Fermoy
20th „ ..	820	672	9	..	9	44	819·5	10·98	53·66	Cork & Kinsale
22nd „ ..	473	511	3	3	6	16	1080·4	12·68	33·83	Stirling
23rd „ ..	518	605	3	..	3	17	1168·0	5·79	32·82	Aberdeen
	15,599	15,796	124	31	155	516	1012·7	9·94	33·09	

In the Household Cavalry the ratio of admissions has been highest in the Royal Horse Guards, of deaths in the 2nd, and of invaliding in the 1st Life Guards. In the Cavalry, the 15th Hussars, at Newbridge and Edinburgh, and the 2nd Dragoons, at Birmingham and Aldershot, have furnished the highest; and the 4th Hussars, at Dublin, the Curragh, and Dundalk, the lowest proportion of admissions. Of the Foot Guards, the 3rd Battalion Grenadier Guards, at London, Windsor, and Aldershot, has had the greatest proportion of

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admissions; and the 2nd Battalion Coldstream Guards, at the same stations, the lowest.

In the Infantry, the admissions have been most numerous, in the 85th, at Dover, Shorncliffe, and Aldershot, and next to it stands the 75th Regiment. The 1st Battalion 5th Regiment, at Shorncliffe, London, and Woolwich, and the 73rd Regiment, at Aldershot and Shorncliffe, had the lowest ratio of admissions.

Re-Vaccination.—There were, during the year, 1,547 soldiers and 12,110 recruits reported to have been vaccinated. The following Table, prepared from Abstract No. II of Appendix, shows the results:—

	Total number Vaccinated.	Results.	Ratio per 1,000. In those who bore marks of previous Small-Pox.	In those who bore good marks of previous Vaccination.	In those who bore doubtful marks of previous Vaccination.	In those who bore no marks of previous Vaccination or Small-pox.	Total.
Soldiers, not Recruits	1,547	A perfect Vaccine Pustule	276·7	462·3	417·3	472·1	438·9
		A modified ditto	219·8	292·5	336·4	278·6	300·6
		A failure in	483·5	245·2	246·3	249·3	260·5
		Total..	1000·	1000·	1000·	1000·	1000·
Recruits..	12,110	A perfect Vaccine Pustule	395·8	445·6	623·2	612·4	452·3
		A modified ditto	236·3	243·2	308·6	170·8	241·3
		A failure in	367·9	311·2	268·2	216·8	306·4
		Total..	1000·	1000·	1000·	1000·	1000·

The proportion of cases in which the result has been reported a "a perfect vaccine pustule" has been higher and that of "failure" lower than in 1863 both among the soldiers and the recruits.

The state of vaccination among the recruits found fit for service at the head-quarters of the recruiting districts, is shown in the following Table:—

Recruiting Districts.	Marks of Small-Pox.	Marks of Vaccination.	No satisfactory Marks.	Proportion in every 1,000. Marks of Small-Pox.	Marks of Vaccination.	No satisfactory Marks.
London	193	2,730	82	64·2	908·5	27·3
Liverpool	175	1,130	116	123·2	795·2	81·6
Bristol	45	625	132	56·1	779·3	164·6
Leeds	63	384	53	126·0	768·0	106·0
Edinburgh	77	704	78	89·6	819·6	90·8
Glasgow	87	561	23	129·6	836·1	34·3
Belfast	27	279	28	80·8	835·4	83·8
Dublin	67	699	32	84·0	875·9	40·1
Cork	74	273	3	211·4	780·0	8·6
Total England..	476	4,869	383	83·1	850·0	66·9
Total Scotland..	164	1,265	101	107·2	826·8	66·0
Total Ireland ..	168	1,251	63	113·4	844·1	42·5
Total ..	808	7,385	547	92·4	845·0	62·6

This Table shows an increase in the number having marks of small-pox in Ireland, and a decrease in Scotland, while in England the proportion remains as in 1863. The proportion having no satisfactory marks is lower than in the preceding year in England and Scotland but much higher in Ireland, where it had been previously so low as to lead to a suspicion of some error in the returns. *United Kingdom.*

Section II.

On the Extent of Invaliding.

The number of soldiers discharged as invalids in 1864 from the troops serving in the United Kingdom, and also from each arm of the service is shown in the following Table:—

	Troops generally.	Household Cavalry.	Dragoon Guards and Dragoons.	Royal Artillery (including the Depôt Brigade.)	Military Train.	Foot Guards.	Infantry Regiments.	Cavalry Depôts.	Depôt Battalions.
Strength	73,252	1,216	8,586	10,653	1,134	4,192	20,748	1,025	15,599
1864.. Number discharged as Invalids	2,325	20	304	346	20	155	683	12	516
1864.. Ratio per 1,000 ..	31·74	16·45	35·41	32·50	17·64	36·98	32·92	11·71	33·09
1860–63, Ratio per 1,000	42·18 *	12·91	30·92	24·51	29·77	29·89	28·90	46·94	47·00

There has been a slight reduction in the invaliding of the troops generally compared with the proportion in 1863. In the Household Cavalry the ratio has been the same as that of last year; in the Military Train, Infantry Regiments, Cavalry Depôts, and Depôt Battalions there has been a decrease, and in the other arms an increase. The causes of invaliding from the different arms will be found stated in Abstract No. I of Appendix; in all, except the Military Train and Cavalry Depôts, the class of tubercular diseases is that which has been the most frequent cause of disability.

* The ratio for 1861–3 only.

Section III.

On the Number constantly Sick in Hospital of the Troops serving in the United Kingdom.

United Kingdom. The following Table shows the proportion constantly non-effective from sickness, the average sick time to each soldier and the average duration of the cases in hospital :—

		Troops generally.	Household Cavalry.	Cavalry of the Line.	Royal Artillery.	Military Train.	Foot Guards.	Infantry Regiments.	Cavalry Depôts.	Depôt Brigade Royal Artillery.	Depôt Battalions.
Mean Daily Sick per 1,000 of strength ..	1864..	47·66	33·96	47·41	49·54	48·50	60·64	41·65	59·90	38·28	44·33
	1860–3	53·14	31·69	44·08	53·22	54·45	54·37	45·28	59·33	74·31	51·42
		Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.
Average Sick Time to each Man in the course of the Year	1864	17·39	12·40	17·31	18·08	17·70	22·13	15·20	21·87	13·97	16·18
	1860–3	19·39	11·57	16·07	19·43	19·87	19·85	16·53	21·65	27·12	18·77
Average duration of the Cases	1864	18·00	17·84	18·88	17·89	19·49	20·89	19·00	20·41	15·14	15·97
	1860–3	19·20	20·10	16·88	19·70	18·70	23·72	19·50	16·88	20·06	18·95

The mean daily sick of the troops, generally, has been considerably under the average of the four preceding years; in the Household Cavalry, Cavalry of the Line, and Foot Guards the ratio has been above, but in all the other arms it has been under the average. The excess in the Foot Guards may probably have been due to the circumstance that invalids from the battalions in Canada joined the head-quarters in London instead of, as in the Artillery and Line Regiments, being sent to Netley; as some of these men must have arrived in England in a state requiring medical treatment, they would unduly increase the mean daily sick of the battalion to which they were attached.

Section IV.

On the Influence of Age on the Mortality of Troops serving in the United Kingdom.

The number of men serving and the deaths at each quinquennial period of life in the different arms is shown in Abstract No. III of Appendix. The following Table gives the result for 1864, and the average for the five preceding years, and also the ratio of mortality in the civil population at corresponding periods :—

United Kingdom.

Corps.	Annual Ratio of Deaths per 1,000 Living at the following Ages —					
	Under 20.	20–24.	25–29.	30–34.	35–39.	40 and upwards.
Household Cavalry	31·25	2·44	3·55	..	..	..
Dragoon Guards and Dragoons	3·15	4·90	5·31	14·51	31·75	19·92
Royal Artillery	5·88	6·21	7·35	9·76	16·59	19·23
Military Train	..	7·59	13·51	10·10	..	..
Foot Guards	3·85	9·06	10·00	22·95	..	77·28
Infantry Regiments	1·32	5·70	8·37	13·30	23·38	11·63
Cavalry Depôts, Depôt and Coast Brigades Royal Artillery, and Depôt Battalions	5·46	6·14	11·04	16·50	20·66	26·32
Ditto, ditto, 1859-63	5·25	9·38	12·01	21·20	25·99	32·64
Average of preceding, exclusive of all Depôts	4·06	5·85	7·82	13·10	20·62	15·94
Ditto, ditto, 1859-63	2·97	6·13	8·36	12·03	14·55	20·36
Civil Male Population — England and Wales	7·41	8·42	9·21	10·23	11·63	13·55
Civil Male Population — Healthy Districts	5·83	7·30	7·93	8·36	9·00	9·86

These results show the deteriorating influence of military service upon life. Under 30 years of age the mortality of the troops, exclusive of the Depôts, is lower than that of the civil population at the same ages; a result probably due in some measure to the selection of recruits, and to the discharge by invaliding of men not likely to be efficient. But above 30 there is a marked increase in the proportional mortality in the army, and this is shown among the men of the Depôts at a still earlier period. The relatively high ratio of mortality in the Depôts is no doubt due to the number of men sent to them from the service companies abroad, with constitutions injured by tropical service, and many affected with organic disease.

Section V.

On the Recruiting for the Army.

In previous Reports there has been an important defect in this section. No information could be obtained as to the number of recruits inspected by civil practitioners. Those who were deemed fit for service by them appeared among the secondary inspections in the Returns of the Recruiting Districts and of Corps, but nothing was known of the total number primarily inspected, the number rejected, and the causes of rejection. In the beginning of 1864, arrangements were made by which this information is now obtained through the officers employed on the recruiting service, and we are thus enabled, for the first time, to give complete statistics on this subject.

During the year 1864, there were 27,754 recruits examined at the head-quarters of the recruiting districts, at Regiments and Depôt Battalions, and by civilians. Of these 10,725 were rejected at the primary inspection, being in the ratio of 386 per 1,000. Of those found fit, 1,720 were subsequently

United Kingdom.

rejected at the secondary inspection, making a total of 12,445, or in the ratio of 448 per 1,000 inspected. The following shows in a tabular form the results of the district, regimental, and civilian inspections respectively :—

	Number of Recruits Primarily Inspected.	Number Rejected.			Ratio of Rejections per 1,000 Examined.	
		Primary Inspections.	Secondary Inspections.	Total.	Primary Inspections.	Primary and Secondary Inspections.
At Head-Quarters of Recruiting Districts	10,877	4,863	449	7,876	447·1	447·5
At Regiments and Depôts	6,722	2,564			381·4	
By Civil Medical Practitioners ..	10,155	3,298	1,271	4,569	324·8	449·9
Total	27,754	10,725	1,720	12,445	386·4	448·4

The proportion rejected on primary inspection by Army Medical Officers has been considerably lower than in 1863, when it amounted in the districts to 499, and at the Regiments and Depôts to 417 per 1,000 examined. This Table brings out a most important fact with reference to the examination of recruits by civilians ; although the ratio of rejections at the primary inspection is considerably lower than that by Army Medical Officers, yet it is so much greater on the secondary inspection of recruits passed by them that the proportion of men ultimately passed into the service by the two classes of examiners is almost identical. It may be necessary to remark that secondary rejections are almost invariably the result of an opinion expressed not by a single medical officer, but by a Board.

As considerable expense is often incurred before a recruit is brought up for the secondary inspection, either at the head-quarters of the district in which he has been enlisted, or at his Regiment or the Depôt Battalion, it seems a question of some importance, financially, whether it would not be possible to introduce a little more strictness into the examination by civil medical practitioners, and reduce this expense without materially affecting the number of recruits ultimately found fit for service.

The proportion rejected in each of the recruiting districts is shown in the following Table, framed from Abstract No. IV. of Appendix :—

Districts.	Total Number Inspected.		Ratio found Unfit per 1,000 Inspected.	
	Primary Inspections.	Secondary Inspections.	Primary Inspections.	Secondary Inspection.
London	3,912	1,463	445	173
Liverpool	1,939	932	544	328
Bristol	366	917	325	207
Leeds	473	517	455	299
Edinburgh	830	258	251	81
Glasgow	1,148	94	418	138
Dublin	1,482	280	466	232
Cork	359	239	460	121
Belfast	368	362	516	268
Total	10,877	5,062	447	223
Ratio in 1863	..	..	499	303

This Table shows the rejections at both primary and secondary inspections to have been considerably under the ratio of the preceding year. The proportion rejected has varied greatly in different districts, Liverpool and Belfast being very much in excess of the average, while Edinburgh and Bristol have been much under it. *United Kingdom.*

The following Table shows the native countries of the recruits examined, and the number found unfit for service:—

Native Countries of Recruits.	Head-Quarters of Recruiting Districts.		Head-Quarters of Regiments and Depôts.		By Civil Medical Practitioners.		Subsequently Rejected on Secondary Inspection.		Total.		Proportion Rejected per 1,000 Inspected.
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Of those who had been found fit by Army Surgeons.	Of those who had been found fit by Civilians.	Primarily Inspected.	Rejected at Primary and Secondary Inspections.	
England	5,192	2,423	3,464	1,293	6,573	2,203	265	785	15,229	6,969	457·6
Wales	132	51	43	5	218	67	1	20	393	144	366·4
Scotland	1,840	635	666	216	595	154	35	69	3,101	1,109	357·6
Ireland	3,660	1,729	2,479	1,042	2,738	870	146	392	8,877	4,179	470·8
British Colonies and Foreign Countries ...	53	25	70	8	31	4	2	5	154	44	285·7
Total ...	10,877	4,863	6,722	2,564	10,155	3,298	449	1.271	27,754	12,445	448·4

Omitting the last class, the numbers of which are too small to justify any deductions, it appears that the proportion rejected of the Scotch recruits has been nearly one-fourth under that of the English, the proportion of the Welsh has been very slightly higher than the Scotch, and that of the Irish than the English.

From this Table we find that the proportion of recruits furnished by each country has been as follows:—

By England and Wales	563 in every 1,000
Scotland	112 ,,
Ireland	320 ,,
Colonies and Foreign Countries	5 ,,

This shows a slight decrease in the proportion from Scotland, and a corresponding increase from England and Wales compared with the results for 1863. But the comparison is not strictly accurate as in the Return for that year, the inspections by civilians were not included, and the proportion was calculated on the primary and secondary inspections taken together.

The numbers inspected for each arm of the service, and the proportion rejected, are shown in the following Table:—

United Kingdom.

	Head-Quarters of Recruiting Districts.		Regiments and Depot Battalions.		Inspected by Civil Medical Practitioners.		Total Primary Inspections.		Rejected on Secondary Inspection.	Total.		Ratio of Rejection per 1,000 Recruits Inspected.
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.		Inspected.	Rejected.	
Household Cavalry	...	...	191	75	...	...	191	75	...	191	75	392·7
Cavalry of the Line and Military Train	1,014	425	460	208	159	49	1,633	682	56	1,633	738	451·9
Royal Artillery and Engineers	875	335	593	233	124	38	1,592	606	41	1,592	647	406·4
Foot Guards	102	32	221	97	1,002	235	1,325	364	171	1,325	535	403·8
Infantry Regiments and Depôts	8,886	4,071	5,257	1,951	8,870	2,976	23,013	8,998	1,452	23,013	10,450	454·1
Total	10,877	4,863	6,722	2,564	10,155	3,298	27,754	10,725	1,720	27,754	12,445	448·4

The lowest ratio of rejections has been in the Household Cavalry, in which all the recruits are enlisted at the head-quarters of the Corps, and their fitness decided upon by the Regimental Surgeon; and the highest in the Cavalry and Infantry of the Line, the results for these two arms being almost identical.

The causes assigned for the unfitness for military service of the recruits rejected are shown in a classified form in the following Table:—

RETURN showing the Number of Recruits Rejected during the Year 1864, with the Causes arranged in Classes, and the Ratio per 1000 in each Class.

Class.	Causes of Rejection, in Classes.	Primary Inspections.								Rejected on Secondary Inspection.		Total Rejected on both Primary and Secondary Inspection.					
		At Head-Quarters of Recruiting Districts.		At Head-Quarters of Regiments & Depôts.		By Civil Medical Practitioners.		Total.		Of Recruits previously examined by Army Medical Officers.	Of Recruits previously examined by Civilians.	Of Recruits examined by Army Medical Officers.		Of Recruits examined by Civil Medical Practitioners.		Total.	
		10,877		6,722		10,155		27,754				17,599		10,155		27,754	
		Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.			Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.
1	Syphilis	115	10·57	108	16·07	180	17·73	403	14·49	14	51	237	13·47	231	22·75	468	16·86
2	Other Zymotic Diseases	13	1·20	20	2·98	4	·39	37	1·33	8	3	41	2·33	7	·69	48	1·73
3	Scrofula	163	14·99	51	7·59	99	9·75	313	11·28	11	37	225	12·78	136	13·39	361	13·00
4	Phthisis	46	4·23	39	5·80	42	4·14	127	4·58	11	15	96	5·45	57	5·61	153	5·51
5	Other Constitutional Diseases	18	1·66	31	4·61	9	·88	58	2·09	13	21	62	3·52	30	2·95	92	3·31
6	Diseases of Brain, Spinal Cord, and Nerves	11	1·01	4	·59	10	·98	25	·90	1	2	16	·91	12	1·18	28	1·00
7	Diseases of Eyes and Eyelids	585	53·78	272	40·46	321	31·61	1,178	42·45	65	128	922	52·39	449	44·22	1,371	49·40
8	Diseases of Nose and Mouth	27	2·48	7	1·04	2	·19	36	1·30	8	18	42	2·38	20	1·97	62	2·23
9	Diseases of Ears	44	4·05	1	·15	4	·39	49	1·77	5	12	50	2·84	16	1·58	66	2·38
10	Deafness	24	2·21	3	·45	4	·39	31	1·12	4	11	31	1·76	15	1·48	46	1·66
11	Impediment of Speech	23	2·11	4	·59	4	·39	31	1·12	3	3	30	1·70	7	·69	37	1·33
12	Disease of Heart	144	13·24	122	18·15	199	19·60	465	16·75	25	59	291	16·54	258	25·41	549	19·78
13	Disease of Arteries (Aneurism)	12	1·10	9	1·34	..	..	21	·76	8	4	29	1·65	4	·40	33	1·19
14	Disease of Veins (Varix)	580	53·32	265	39·42	421	41·46	1,266	45·62	39	123	884	50·23	544	53·57	1,428	51·45
15	Disease of Lungs (except Phthisis)	34	3·13	29	4·31	64	6·30	127	4·58	17	19	80	4·55	83	8·17	163	5·87
16	Small or Malformed Chest, or Curvature of Spine	308	28·32	439	65·31	211	20·78	958	34·52	34	79	781	44·38	290	28·56	1,071	38·60

RETURN, &c.—*continued.*

Class.	Causes of Rejection, in Classes.	Primary Inspections.								Rejected on Secondary Inspection.		Total Rejected on both Primary and Secondary Inspection.					
		At Head-Quarters of Recruiting Districts.		At Head-Quarters of Regiments & Depôts.		By Civil Medical Practitioners.		Total.		Of Recruits previously examined by Army Medical Officers.	Of Recruits previously examined by Civilians.	Of Recruits examined by Army Medical Officers.		Of Recruits examined by Civil Medical Practitioners.		Total.	
		10,877		6,722		10,155		27,754				17,599		10,155		27,754	
		Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.			Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.
17	Loss or Decay of many Teeth	174	16·00	49	7·29	91	8·96	314	11·31	14	46	237	13·47	137	13·49	374	13·48
18	Hernia	155	14·25	53	7·88	197	19·40	405	14·59	2	44	210	11·93	241	23·73	451	16·25
19	Laxity of Abdominal Rings, showing tendency to Hernia	136	12·50	74	11·01	34	3·35	244	8·79	10	36	220	12·50	70	6·89	290	10·59
20	Hæmorrhoids	38	3·49	7	1·04	25	2·46	70	2·52	..	12	45	2·56	37	3·64	82	2·95
21	Diseases of the Urinary Organs	..	..	..	..	2	·19	2	·05	1	2	1	·06	4	·40	5	·18
22	Varicocele	368	33·83	95	14·13	359	35·40	822	29·62	31	58	494	28·07	417	41·06	911	32·82
23	Hydrocele	43	3·95	8	1·19	9	[illegible]	60	2·16	1	21	52	2·96	30	2·95	82	2·95
24	Other Diseases of the Genital Organs (not Venereal)	47	4·32	11	1·64	30	2·95	88	3·17	2	36	60	3·41	66	6·50	126	4·54
25	Muscular Tenuity	483	44·41	158	23·50	131	12·90	772	27·82	25	75	666	37·84	206	20·28	872	31·41
26	Debility	56	5·14	40	5·95	64	6·30	160	5·77	13	28	109	6·19	92	9·06	201	7·24
27	Defects of Upper Extremities, from Fracture, Contraction, Luxation, &c. ..	113	10·39	70	10·41	69	6·79	252	9·08	8	29	191	10·85	98	9·65	289	10·41
28	Defects of Lower Extremities, from Fracture, Contraction, Luxation, &c. ..	430	39·53	211	31·39	310	30·53	951	34·27	27	113	668	37·96	423	41·66	1,091	39·31
29	Diseases of Joints	43	3·95	25	3·72	32	3·15	100	3·60	8	10	76	4·32	42	4·13	118	4·25

RETURN, &c.—*continued.*

Class.	Causes of Rejection, in Classes.	Primary Inspections.								Rejected on Secondary Inspection.		Total Rejected on both Primary and Secondary Inspection.					
		At Head-Quarters of Recruiting Districts.		At Head-Quarters of Regiments & Depôts.		By Civil Medical Practitioners.		Total.				Of Recruits examined by Army Medical Officers.		Of Recruits examined by Civil Medical Practitioners.		Total.	
		10,877		6,722		10,155		27,754				17,599		10,155		27,754	
		Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Of Recruits previously examined by Army Medical Officers.	Of Recruits previously examined by Civilians.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.	Number Rejected.	Ratio per 1,000.
30	Other Affections of Bones and Muscles ..	38	3·49	26	3·87	16	1·57	80	2·88	3	10	67	3·81	26	2·56	93	3·35
31	Ulcers, Wounds, and Cicatrices	196	18·02	72	10·71	96	9·45	364	13·12	10	44	278	15·80	140	13·78	418	15·06
32	Other Affections of Cutaneous System ..	41	3·77	41	6·10	100	9·85	182	6·56	8	14	90	5·11	114	11·23	204	7·35
33	Weakness of Intellect	13	1·20	15	2·23	5	·49	33	1·19	1	6	29	1·65	11	1·08	40	1·44
34	Malformation of Ears	3	·28	1	·15	..	..	4	·15	..	..	4	·23	..	..	4	·14
35	,, Nose and Mouth	8	·74	3	·45	..	..	11	·40	1	..	12	·68	..	..	12	·43
36	,, Chest and Spine	38	3·49	36	5·36	1	·10	75	2·70	3	17	77	4·37	18	1·77	95	3·42
37	,, Urinary and Genital Organs	26	2·39	2	·30	1	·10	29	1·04	..	6	28	1·59	7	·69	35	1·26
38	Marks of Punishment or letters D or B C..	54	4·97	26	3·87	10	·98	90	3·25	4	6	84	4·76	16	1·58	100	3·60
39	Unsound Health	213	19·58	137	20·38	122	12·01	472	17·01	11	73	361	20·47	195	19·20	556	20·03
	*Over age (2), under height (18)	..	..	..	..	20	1·97	20	·72	..	20	..	..	20	1·97	20	·44
	Total	4863	447·09	2564	381·43	3298	324·76	10,725	386·43	449	1271	7876	447·52	4569	449·92	12,445	448·40

* These Recruits should not have been submitted to medical inspection.

United Kingdom.

This Table shows the principal causes of rejection to have been varicose veins, diseases of the eyes and eyelids, defects of lower extremities from fractures, &c., small or malformed chest, varicocele, and muscular tenuity. There are some points in this Table worthy of remark with regard to the causes of rejection under the different modes of inspection. For instance, the proportion rejected by civilians on account of diseases of the eyes, small or malformed chest, laxity of abdominal rings, muscular tenuity, and unsound health, has been considerably lower than that by military surgeons, and, as might be anticipated, the proportion rejected on secondary inspection for these causes has been relatively much higher among the recruits previously passed by civilians. But we find the same ultimate result with regard to some other causes, such as disease of the heart and hernia, on account of which the rejections have been considerably higher by the civilians than by the army surgeons, and also with regard to some, as varicose veins, loss or decay of many teeth, &c., in which there has been a very trifling difference in the proportion rejected on primary inspection. Again, there is a marked difference in the proportion rejected for various causes of the recruits inspected at the head-quarters of districts compared with those at Regiments and Depôt Battalions. For instance, the proportion is much higher in the recruiting districts of men rejected for diseases of the eyes and lids, varicose veins, varicocele, hernia, loss of teeth, and muscular tenuity. This may probably depend on the circumstance that the decision of the Staff Surgeon of the district is always subject to revision on the recruit joining his corps, and he, therefore, exercises a considerable amount of caution in cases where the unfitness depends, not so much on the existence as on the extent of the disability. On the other hand, the opinion of the Regimental Surgeon, in cases where the recruit is enlisted for his own Regiment, not being liable to such revision, he is enabled to exercise a latitude in his selection in such cases which would be scarcely safe on the part of the Staff Surgeon.

There is another peculiarity brought out by this Table which is worthy of notice,—the very large proportion rejected on primary inspection at the Regiments and Depôt Battalions on account of small or malformed chest, and for malformation of chest and spine, a result doubtless due to the anxiety of the Medical Officer to avoid taking puny or misshapen men, or such as are from their appearance deemed likely to break down under drill, and to prove inefficient as soldiers.

The following Table, prepared from Abstract No. VI of Appendix, shows the proportion of recruits at different ages in the total number inspected :—

Proportion in 10,000 Examined.	Boys under 17.	17 to 18.	18 to 19.	19 to 20.	20 to 21.	21 to 22.	22 to 23.	23 to 24.	24 to 25.	25 and upwards.
At Head-Quarters Recruiting Districts ..	282	512	3,006	1,850	1,246	876	711	592	607	318
At Regiments and Depôts ..	362	926	3,151	1,857	1,295	781	622	434	295	277
By Civil Medical Practioners ..	62	361	3,393	2,189	1,296	772	654	511	561	201
Total ..	262	641	3,154	1,932	1,275	814	662	511	472	274

It will be observed that the proportion under 18 is much higher at the Regiments than either in the recruiting districts or those examined by civilians, a result arising probably from the necessity for obtaining a special authority for the enlistment of lads and boys.

The minimum standard for Infantry recruits was lowered to 5 feet 5 inches in the beginning of March. The following summary, prepared from Abstract No. VI of Appendix, shows the proportion inspected at each height in 10,000 recruits.

Proportion in 10,000 Examined.	Inspected at Head-Quarters Recruiting Districts.	Inspected at Regiments and Depôts.	Inspected by Civil Medical Practitioners.
Ft. In. Ft. In.			
Under 5 3 ..	267	340	48
5 3 to 5 4 ..	23	74	17
5 4 „ 5 5 ..	400	708	993
5 5 „ 5 6 ..	3,314	3,040	3,565
5 6 „ 5 7 ..	2,596	2,519	2,232
5 7 „ 5 8 ..	1,678	1,508	1,331
5 8 „ 5 9 ..	873	886	937
5 9 „ 5 10 ..	478	447	478
5 10 „ 5 11 ..	230	226	245
5 11 „ 6 0 ..	97	124	94
6 0 and upwards ..	44	128	60

The following Table, compiled from Abstract No. VII of Appendix, shows the proportion of men of different weights inspected in 1864 at the head-quarters of the recruiting districts. We have no information on this point respecting the other recruits:—

lbs.		lbs.	
Under 100		.. ..	264
From 100	to 110	.. ..	189
„ 110	120	.. ..	1,456
„ 120	130	.. ..	3,317
„ 130	140	.. ..	2,698
„ 140	150	.. ..	1,282
„ 150	160	.. ..	486
„ 160	170	.. ..	174
„ 170 and upwards		.. ..	34
			10,000

The state of education among the recruits examined at the recruiting districts and at the Regiments and Depôts is shown in the following Table framed from Abstract No. VIII of Appendix. We have no information on this head respecting the recruits examined by civilians.

Of every 1,000 Recruits Examined.	Unable to Read or Write.	Able to Read only.	Able to Read and Write.
At Head-Quarters of Recruiting Districts	246	98	656
At Regiments and Depôts	181	136	683
Total ..	222	112	666

Compared with the corresponding information in the Report for 1863, these results show a decrease in the proportion of men unable to read or write, and an increase in the districts of those able to read and write, and at the Regiments of those able to read only.

The following Table shows the occupations of the recruits inspected, and the numbers rejected of each group:—

United Kingdom.

Occupations of Recruits.	Number Inspected.	Rejected on Primary Inspection.	Rejected on Secondary Inspection.	Total Rejected.	Ratio per 1,000 Rejected.
1. Labourers, Husbandmen, and Servants	16,031	6,381	1,053	7,434	463·72
2. Manufacturing Artisans (as Clothworkers, Weavers, Lace Makers, &c.)	3,836	1,606	243	1,849	482·01
3. Mechanics employed in Occupations favourable to physical development (as Carpenters, Smiths, Masons, &c.)	4,719	1,768	249	2,017	427·42
4. Shopmen and Clerks	1,755	655	81	736	419·37
5. Professional Occupations, Students	178	70	19	89	500·00
6. Boys	577	86	22	108	187·17
Total*	27,096	10,566	1,667	12,233	451·46

The proportion of rejections has been highest in the class of professional occupations, and next to it in that of manufacturing artisans, and with the exception of boys, who form a special class, it has been lowest among the shopmen and clerks.

Of every 1,000 recruits examined, the proportion furnished by each group of occupations was as follows :—

1. Labourers, Husbandmen, and Servants .. .. 591·6
2. Manufacturing Artisans (as Clothworkers, Weavers, Lace Makers, &c.) .. .. 141·6
3. Mechanics employed in Occupations favourable to Physical Development (as Carpenters, Smiths, Masons, &c.) .. .. 174·1
4. Shopmen and Clerks .. .. 64·8
5. Professional Occupations, Students .. .. 6·6
6. Boys .. .. 21·3

Compared with the results in 1863, this Table shows a considerable increase in the number of the class of labourers, &c., and a slight one in the manufacturing artisans, while there has been a decrease in the other groups

* A deficiency of 658 in the number of recruits inspected, of 159 in that rejected on primary inspection, and of 53 on secondary inspection, is the result of omissions or inaccuracies in the returns of the 58th and 1st Battalion 60th Regiments, the 9th and 12th Depôt Battalions, and of the recruits examined by civilians for the Foot Guards.

II.—ON THE HEALTH OF THE TROOPS SERVING IN THE MEDITERRANEAN.

Section I.—Sickness and Mortality.

I.—Gibraltar.

Gibraltar.

In June, upon the cession of the Ionian Islands to Greece, a company of the Royal Engineers and the two Battalions of the 9th Regiment arrived in Gibraltar from Corfu, and in the end of October the 86th landed from England. On the arrival of the troops from Corfu the 2nd Battalion 2nd Regiment sailed for Bermuda, and the 2nd Battalion 3rd Regiment for Barbadoes. In the end of July the company of Royal Engineers proceeded to England, and in the beginning of November the 2nd Battalion 9th Regiment, on being relieved by the 86th, sailed for China.

The average strength of the troops in Gibraltar during the year was 5,281 non-commissioned officers and men, among whom 3,304 admissions into hospital and 24 deaths occurred; of the latter 3 took place out of hospital. There were also 6 deaths among the invalids sent to England, which increase the total to 30. The ratio of admissions into hospital, therefore, was 626, and of deaths 5·68 per 1,000 of the strength, the former being considerably under, and the latter 0·63 per 1,000 above, the proportions in 1863.

The admissions and deaths in each corps are shown in the following Table, in which the necessary correction in the strength of those corps which were at Gibraltar during part of the year only, has been made:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000 of Strength.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	890	673	5	..	..	5	767	5·61
Royal Engineers	316	259	2	1	..	3	820	9·49
2nd Battalion 2nd Regiment ..	391	316	..	..	..	..	808	..
„ „ 3rd „ ..	372	255	5	..	..	5	686	13·38
1st „ 9th „ ..	396	253	2	..	1	3	639	7·58
2nd „ 9th „ ..	316	255	2	..	1	3	807	9·49
„ „ 15th „ ..	762	339	1	..	3	4	445	5·25
„ „ 23rd „ ..	810	436	3	2	1	6	538	7·41
86th Regiment	134	105	..	..	..	..	784	..
4th Battalion Rifle Brigade ..	817	395	1	..	..	1	484	1·22

The diseases by which the admissions and deaths were occasioned are stated in Abstract No. IX of Appendix. The classified results are shown in the following Table:—

Gibraltar.

Orders.	Diseases.	1864. Average Strength, 5,281.						1859-63.		1864. Infantry at Home.	
		Admitted into Hospital.	Deaths.		Total Died.	Annual ratio per 1,000 of Strength.		Annual ratio per 1,000 of Strength.		Annual ratio per 1,000 of Strength.	
			At Gibraltar.	Of Invalids.		Admitted.	Died.	Admitted.	Died.	Admitted	Died.
	Class I.										
1	Miasmatic Diseases ..	949	6	..	6	179·7	1·14	284·8	4·17	149·7	1·45
2	Enthetic „ ..	835	..	..	..	158·1	..	195·4	..	250·9	·28
3	Dietic „ ..	28	..	..	..	5·3	..	14·8	·15	6·8	·15
4	Parasitic „ ..	22	..	..	..	4·2	..	8·3	..	32·0	..
	Class II.										
1	Diathetic Diseases ..	17	..	1	1	3·2	·19	3·7	·07	3·5	·05
2	Tubercular „ ..	35	4	2	6	6·7	1·14	7·2	1·04	16·9	2·02
	Class III. Diseases of the—										
1	Nervous System ..	72	2	..	2	13·6	·38	19·9	·26	15·0	1·01
2	Circulatory „ ..	32	3	..	3	6·1	·56	7·4	·63	8·0	·96
3	Respiratory „ ..	206	7	1	8	39·0	1·51	57·1	·18	73·8	1·35
4	Digestive „ ..	113	..	1	1	21·4	·19	40·7	·33	34·3	·67
5	Urinary „ ..	2	..	..	..	·4	..	2·8	·18	2·8	·14
6	Reproductive „ ..	91	..	..	..	17·2	..	16·7	..	11·6	..
7	Locomotive „ ..	17	..	..	..	3·2	..	4·7	·07	3·3	..
8	Integumentary „ ..	459	..	..	..	86·9	..	136·6	..	115·1	..
	Class IV.										
4	Diseases of Nutrition	26	..	1	1	4·9	·19	1·8	..	2·1	..
	Class V.										
1	Accidents	373	..	..	..	70·6	..	81·2	·44	72·1	·39
3	Homicide	..	..	..	..	..	..	..	·11	..	·05
4	Suicide	1	2	..	2	·2	·38	·3	·37	·1	·21
5	Execution	..	..	..	..	..	..	..	·11	..	..
6	Corporal Punishment	20	..	..	..	3·8	..	3·6	..	1·3	..
	Diseases not stated ..	..	..	..	..	..	..	2·7	..	..	..
	No appreciable Disease	6	..	..	..	1·1	..	·8	..	·2	..
	Total	3,304	24	6	30	625·6	5·68	890·5	8·11	800·0	8·77

This shows a great reduction in the admissions compared with the average of the four preceding years. It has been most marked in miasmatic diseases, but has extended to all other classes, except diseases of the reproductive system and of nutrition and corporal punishment. The mortality also, though slightly higher than in 1863, has been much under the average.

MIASMATIC DISEASES.—The admissions by this class of diseases show a reduction to the extent of more than one third. The influence of the principal diseases comprised in it is shown in the following Table:—

Gibraltar.

Miasmatic Diseases.	Admitted.	Died.	Annual ratio per 1,000. 1864. Admitted.	1864. Died.	1859–63. Admitted.	1859–63. Died.
Eruptive Fevers	5	..	·9	..	1·5	·13
Paroxysmal „	9	..	1·7	..	7·0	·15
Continued „	274	6	51·9	1·14	98·2	2·36
Dysentery, Diarrhœa, and Cholera	69	..	13·1	..	65·7	1·40
Sorethroat and Influenza	94	..	17·8	..	20·3	..
Ophthalmia	261	..	49·4	..	40·8	..
Rheumatism	181	..	34·3	..	39·0	·04

The reduction has taken place chiefly in *Continued Fevers* and in *Dysentery and Diarrhœa.* In the former it is still more marked if compared with the amount in 1863, when the ratio was 115 per 1,000. The prevalence of dysentery and diarrhœa in 1863 amounted to only half the average, and in the year now under review there was a still further reduction, the ratio being only one fifth of the average of the five preceding years.

Ophthalmia.—There has been an increase in the proportion of admissions by this disease. It has been entirely due to the number of cases occurring in the 2nd Battalion 9th Regiment, which, as already stated, joined from Corfu in June ; ophthalmia had been very prevalent in it in 1863, but no special cause could be assigned for it.

Enthetic Diseases.—Although the proportion of venereal cases has been under the average, it has exceeded that of 1863 by 31 per 1,000, so that the reduction noticed in our last Report has not been maintained. It is still, however, much below that of the Infantry serving in the United Kingdom.

II.—Malta.

Malta.

In the end of May three batteries of Royal Artillery, and in the beginning of June the 2nd Battalion 4th Regiment joined from the Ionian Islands ; on the arrival of the latter the 1st Battalion 25th Regiment proceeded from Malta to Canada.

The average strength of the troops during the year, exclusive of the Royal Malta Fencible Artillery, was 5,654 ; the admissions into hospital were 5,167, and the deaths 37, of which 24 occurred in hospital, 10 out of hospital, and 3 among invalids on the passage to England and at the invalid depôt at Netley. These numbers give the proportion of 914 admissions, and 6·53 deaths per 1,000 of mean strength, the former being considerably above and the latter a little under the results for 1863.

The admissions and deaths in each corps were as follows :—

Malta.

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	747	544	7	1	1	9	728	12·04
Royal Engineers	166	155	2	..	..	2	934	12·08
2nd Battalion 4th Regiment ..	450	365	3	3	..	6	811	13·33
„ „ 7th „ ..	826	1057	1	1	..	2	1280	2·42
„ „ 8th „ ..	801	925	1	2	..	3	1192	3·75
1st „ 22nd „ ..	746	424	2	2	1	5	568	6·70
2nd „ „ „ ..	790	562	5	..	1	6	711	7·59
1st „ 25th „ ..	306	161	..	..	..	..	526	..
100th Regiment	771	929	3	1	..	4	1205	5·19

The admissions into hospital were much above the average in the 7th, 8th, and 100th Regiments, all of which were quartered in the island during the whole year.

The diseases by which the admissions and deaths were caused are stated in Abstract No. IX of Appendix, of which the classified summary is given in the following Table :—

Orders.	Diseases.	1864.—Strength, 5,654.						1859–63.	
		Admitted into Hospital.	Deaths.		Total Died.	Annual ratio per 1,000 of Strength.		Annual ratio per 1,000 of Strength.	
			In Malta.	Of Invalids.		Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases..	2,070	9	..	9	366·1	1·59	392·4	5·11
2	Enthetic „ ..	301	..	..	..	53·2	..	97·9	..
3	Dietic „ ..	113	..	..	..	20·0	..	8·3	·14
4	Parasitic „ ..	61	..	..	..	10·8	..	13·2	..
	Class II.								
1	Diathetic Diseases..	41	1	1	2	7·3	·35	3·8	·07
2	Tubercular „ ..	45	3	1	4	8·0	·70	11·3	2·09
	Class III. Diseases of the—								
1	Nervous System ..	149	4	..	4	26·4	·70	15·5	·58
2	Circulatory „ ..	71	1	1	2	12·6	·35	5·2	·48
3	Respiratory „ ..	246	1	..	1	43·5	·18	45·4	·82
4	Digestive „ ..	317	2	..	2	56·1	·35	40·6	·55
5	Urinary „ ..	15	1	..	1	2·7	·18	1·9	·24
6	Reproductive „ ..	92	..	..	..	16·3	..	10·2	..
7	Locomotive „ ..	43	..	..	..	7·6	..	4·0	..
8	Integumentary „ ..	800	1	..	1	141·2	·18	130·2	..
	Class IV.								
4	Diseases of Nutrition.	60	..	..	..	10·6	..	1·5	..
	Class V.								
1	Accidents	722	8	..	8	127·7	1·41	72·0	·93
2	Homicide	..	1	..	1	..	·18	..	..
4	Suicide	2	1	..	1	·4	·18	·1	·27
5	Execution	..	1	..	1	..	·18	..	·03
6	Corporal Punishment	18	..	..	..	3·2	..	3·0	..
	No appreciable disease	1	..	..	..	·2	..	..	..
	Diseases not stated ..	..	..	..	..	..	..	2·3	..
	Total	5,167	34	3	37	913·9	6·53	858·8	11·31

The admissions have been considerably above the average of the five preceding years, and the excess has been chiefly in accidents, and, though to a less extent, in dietic diseases and those of the nervous, digestive, and integumentary systems. Compared with the amount in 1863, they have been more numerous in all the classes, except the parasitic and tubercular diseases. The decrease in the mortality, compared with the average of five years, has been in miasmatic and tubercular diseases.

MIASMATIC DISEASES.—The admissions and deaths by the principal groups forming this class have been as follows :—

Malta.

Diseases.	1864.		Annual Ratio per 1,000 of Strength.			
			1864.		1859–63.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	6	..	1·1	..	1·4	·14
Paroxysmal „	25	..	4·4	..	3·6	..
Continued „	1,057	6	186·9	1·06	173·2	4·05
Dysentery, Diarrhœa, and Cholera ..	290	3	51·3	·53	66·9	·82
Sorethroat and Influenza	87	..	15·4	..	13·3	..
Ophthalmia..	342	..	60·5	..	80·8	..
Rheumatism	182	..	32·2	..	48·8	·07

Continued Fevers have been above the average of the five preceding years and greatly in excess of the proportion in 1863. They were most prevalent in the months of June, July, August, and September, and were attributed by the Medical Officers to the great heat of the season, the exposure of the men to the direct rays of the sun, and defective drainage. The 25th Regiment, which left Malta early in June, had only 16 admissions by fever during the five months preceding its departure; of the other corps, the Royal Artillery and the two battalions of the 22nd Regiment, had the lowest ratio of admissions, although the 1st Battalion of the latter occupied the Floriana, and the second the Lower St. Elmo Barracks, both of which on former occasions furnished large numbers of fever cases. The Surgeon of the 1st Battalion attributes the exemption of the men from fever to the improvements that have been made in the Floriana Barracks since 1862, the period when fever was last epidemic in them, and to the precaution, adopted to prevent overcrowding during the hot months, of placing a number of the men, varying from 100 to 130, under canvas during the night. The comparative exemption enjoyed by the 2nd Battalion, although the prevalence of fever in it was greater than in 1863, may be regarded as a proof of the continued benefit which has resulted from the sanitary improvements effected on the St. Elmo Barracks after the epidemic of 1859. The Surgeon of the Royal Artillery also attributed the health of the Brigade to the good effects produced by the improvements made in the barracks.

Ophthalmia has been considerably under the average of the four preceding years; but this result is probably owing to the two corps which had furnished the largest number of cases in 1862 and 1863, the 2nd Battalions 15th and 23rd Regiments, having left the island in the end of 1863.

The 2nd Battalion 22nd Regiment, which in the latter part of 1863 suffered to some extent from this disease, furnished the largest number of admissions during the year. All other measures having failed to check it, the men affected were in December, 1864, sent to the sanatorium at Citta Vecchia, and it is stated by the Principal Medical Officer that at the date of his report the cases had shown a marked improvement, and the spread of the disease among the healthy men had been checked. The 2nd Battalion 7th Regiment also had a considerable number of cases; but it does not seem to have been deemed necessary to adopt a similar course with regard to them.

Enthetic Diseases, though considerably below the average, show an increase upon the ratio in 1863. This is attributed by the Principal Medical Officer to the arrival in Malta of the women who followed the troops from the Ionian Islands upon the evacuation by the British forces. The increase was principally in primary and secondary syphilis.

Violent Deaths.—Five of the accidental deaths were by drowning, in three of these the men are stated to have been "Found drowned," and in two to have been drowned by the upsetting of a pleasure boat. The homicidal death was that of a serjeant of the 1st Battalion 22nd Regiment, who was shot by a private of the corps, and the execution was that of the murderer.

Royal Malta Fencible Artillery.

Malta.

The average strength of this corps during the year was 569, the admissions into hospital were 567, and the deaths 3. The former, therefore, were in the proportion of 996, and the latter of 5·28 per 1,000 of mean strength.

The diseases by which the admissions and deaths were caused are stated in Abstract No. IX of Appendix, of which the classified results are given in the following Table :—

Orders.	Diseases.	Royal Malta Fencible Artillery. Average Strength. 569 — Admitted.	Died.	Annual Ratio per 1,000. 1864. Admitted.	Died.	1859–63. Admitted.	Died.	Annual Ratio per 1,000 of Strength. Line Regiments at Malta. 1864. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases	180	1	316·3	1·76	211·0	1·00	366·1	1·59
2	Enthetic „	47	..	82·6	..	63·2	..	53·2	..
3	Dietic „	1	..	1·8	..	·3	..	20·0	..
4	Parasitic „	..	..	..	..	4·3	..	10·8	..
	Class II.								
1	Diathetic Diseases	2	..	3·5	..	1·6	..	7·3	·35
2	Tubercular „	..	..	..	..	4·0	1·32	8·0	·70
	Class III.								
	Diseases of the—								
1	Nervous System	11	..	19·3	..	13·9	·66	26·4	·70
2	Circulatory „	1	..	1·8	..	2·3	·66	12·6	·35
3	Respiratory „	59	..	103·7	..	70·8	·33	43·5	·18
4	Digestive „	125	1	219·7	1·76	152·8	1·32	56·1	·35
5	Urinary „	1	..	1·8	..	2·0	..	2·7	·18
6	Reproductive „	2	..	3·5	..	1·6	..	16·3	..
7	Locomotive „	..	..	..	..	..	..	7·6	..
8	Integumentary „	96	..	168·7	..	144·5	..	141·2	·18
	Class IV.								
4	Diseases of Nutrition ..	..	..	..	..	..	..	10·6	..
	Class V.								
1	Accidents	39	1	68·5	1·76	96·9	1·00	127·7	1·41
3	Homicide	..	..	..	..	·3	·66	..	·18
4	Suicide	1	..	1·8	..	·3	..	·4	·18
5	Execution	..	..	..	..	..	..	..	·18
6	Corporal Punishment ..	2	..	3·5	..	·7	..	3·2	..
	No appreciable disease ..	..	..	..	..	..	..	·2	..
	Total	567	3	996·5	5·28	770·5	6·95	913·9	6·53

The admissions into hospital have been considerably above the average of the preceding five years, the excess being most marked in miasmatic and enthetic diseases and in those of the respiratory and digestive systems. The increase in miasmatic diseases was chiefly shown in measles, of which 32 cases occurred, and rheumatism, which prevailed to nearly thrice the usual amount. Measles were epidemic among the civil population in July, August, and September, but did not affect the troops except the Malta Fencibles. Bronchitis

Malta. was the principal disease of the respiratory system, and dyspepsia of the digestive; the latter disease gave rise to 111 admissions. No explanation of this great prevalence of dyspepsia is given by the Medical Officers of the corps.

III.—Ionian Islands.

Ionian Islands. In the beginning of the year the Force employed in these islands consisted of Royal Artillery and Engineers, the 2nd Battalions 4th and 6th Regiments, and the two battalions of the 9th Regiment, the aggregate strength amounting to 3,808. About the middle of March the 2nd Battalion 6th Regiment embarked for Jamaica, and in May, on the cession of the Ionian Islands to Greece, the rest of the troops were withdrawn. The numbers stationed in the Command for this period would represent a mean *annual* strength of 1,415 men; the admissions into hospital amounted to 791 and the deaths to 18, of which 9 occurred out of hospital, and three among invalids sent home for discharge. These numbers give the proportion of 559 admissions and 12·72 deaths per 1,000 of the strength,—the former being much below and the latter considerably above the average. The circumstance, however, must not be overlooked that the period during which the troops were in the Command was that in which the ratio of sickness is generally lowest, and that eight of the deaths were from violence.

The following Table shows the influence of the different classes of diseases in causing this sickness and mortality. The details will be found in Abstract No. IX of Appendix :—

Ionian Islands.

Orders.	Diseases.	1864—Mean Annual Strength, 1,415. Admitted into Hospital.	Deaths. In Ionian Islands.	Deaths. Of Invalids.	Deaths. Total.	Annual Ratio per 1,000 of Strength. Admitted.	Annual Ratio per 1,000 of Strength. Died.
	Class I.						
1	Miasmatic Diseases	228	..	..	..	161·1	..
2	Enthetic „	82	..	..	..	57·9	..
3	Dietic „	16	..	..	..	11·3	..
4	Parasitic „	11	..	..	..	7·6	..
	Class II.						
1	Diathetic Diseases	2	1	..	1	1·8	·71
2	Tubercular „	5	1	1	2	3·5	1·41
	Class III. Diseases of the—						
1	Nervous System	17	..	..	..	12·0	..
2	Circulatory „	7	3	1	4	5·0	2·82
3	Respiratory „	47	2	1	3	33·2	2·12
4	Digestive „	43	..	..	..	30·4	..
5	Urinary „	5	..	..	..	3·5	..
6	Reproductive „	5	..	..	..	3·5	..
7	Locomotive „	3	..	..	..	2·1	..
8	Integumentary „	133	..	..	..	94·0	..
	Class IV.						
4	Diseases of Nutrition	8	..	..	..	5·6	..
	Class V.						
1	Accidents	176	6	..	6	124·4	4·24
3	Homicide	..	1	..	1	..	·71
5	Execution	..	..	..	1	..	·71
6	Corporal Punishment	3	1	..	..	2·1	..
	Total	791	15	3	18	559·0	12·72

We have not given in this Table the results of the four preceding years, as it must be obvious that no fair comparison could be made with them under the peculiar circumstances of the Force in 1864. Of the violent deaths five were by drowning, one the result of an accident received while employed in dismantling the fortifications at Vido, one that of a soldier murdered by a Greek, and one of a serjeant who was hanged for the murder of his wife. The admissions into hospital on account of accidents were much above the average, chiefly from injuries received upon the public works while destroying the fortifications.

As the returns include a portion of the year only, it does not seem necessary to enter into any further details respecting the health of the Force.

Section II.

On the Extent of Invaliding among the Troops serving in the Mediterranean.

Mediterranean. During the year there were 289 invalids sent to England from the Mediterranean Commands, being in the ratio of 23·40 per 1,000 of the strength. The diseases on account of which they were invalided are stated in Abstract No. X of Appendix, from which the following classified summary has been prepared:—

	Gibraltar.	Malta.	Ionian Islands.	Total.
Paroxysmal Fevers	1	1	..	2
Continued „	1	..	..	1
Dysentery and Diarrhœa	3	..	..	3
Ophthalmia	20	4	..	24
Erysipelas	..	3	..	3
Rheumatism	8	5	..	13
Venereal Diseases	4	1	2	7
Dietic „	..	1	..	1
Tubercular „	22	27	3	52
Diseases of the—				
Nervous System..	25	17	3	45
Circulatory „	16	22	1	39
Respiratory „	18	16	3	37
Digestive „	8	6	2	16
Urinary „	1	1	..	2
Locomotive „	1	3	..	4
Integumentary „	7	5	..	12
Diseases of Nutrition	4	7	1	12
Accidents and Violence	3	12	1	16
Total	142	131	16	289
Ratio per 1,000 of Mean Strength { 1864	26·9	23·2	11·3	23·4
{ 1860–3	24·4	16·4	18·6	19·8

The proportion invalided from Gibraltar differs little from the average; from Malta there is an increase, and from the Ionian Islands a decrease, the latter probably depending on the peculiar circumstances in which the Force there was placed.

The numbers finally discharged the service at the Invalid Depôt at Netley during the year were from Gibraltar 112, from Malta 111, and from the Ionian Islands 51, making a total of 274, or in the proportion of 22·2 per 1,000 of the strength.

The disabilities for which these invalids were discharged are classified in the following Table framed from Abstract No. X of Appendix:—

Mediterranean.

Invalids from	Gibraltar.	Malta.	Ionian Islands.	Total Mediterranean Commands.
Paroxysmal Fevers	3	1	1	5
Dysentery and Diarrhœa	1	1	2	4
Ophthalmia..	12	4	1	17
Rheumatism	5	3	..	8
Venereal Diseases	3	4	2	9
Dietic „	..	..	1	1
Diathetic „	2	..	..	2
Tubercular „	23	26	14	63
Diseases of the—				
Nervous System	17	9	2	28
Circulatory „	14	22	9	45
Respiratory „	15	16	8	39
Digestive „	6	6	1	13
Urinary „	..	1	2	3
Reproductive „	1	..	..	1
Locomotive „	3	5	2	10
Integumentary „	4	2	1	7
Diseases of Nutrition	2	3	1	6
Accidents and Violence	1	8	4	13
Total	112	111	51	274
Ratio per 1,000 of { 1864	21·2	19·6	36·0	22·2
Mean Strength { 1859–63 ..	17·7	11·7	9·6	13·3

The number finally discharged has been much above the average of the four preceding years, the excess being chiefly of invalids sent from the Ionian Islands and Malta. Tubercular diseases have been the chief disability from all three Commands. Diseases of the circulatory system have given rise to a high proportion of discharges from Malta, and those of the nervous system from Gibraltar. Diseases of the respiratory system in Gibraltar and Malta, and ophthalmia in Gibraltar, also hold prominent places as causes of invaliding.

Section III.

Mean Daily Sick.

The average number constantly sick in Gibraltar was 191, and in Malta, exclusive of the local corps, 255. These numbers give the following results:—

	Gibraltar.	Malta, exclusive of Royal Malta Fencibles.	United Kingdom. Infantry Regiments. Average of five years, 1860–64.
Average Strength in 1864 ..	5,281	5,654	
Average constantly sick in 1864..	191	255	
Ratio per 1,000 constantly sick { 1864 ..	36·17	45·10	44·68
1859–63..	43·95	45·88	
	days	days	days
Average sick time to each Soldier { 1864 ..	13·20	16·46	16·31
1859–63..	16·04	16·75	
Average duration of the cases of disease { 1864 ..	21·10	18·01	19·42
1859–63..	18·01	19·50	

Mediterranean. As the troops were stationed in the Ionian Islands during part of the year only, and that the most healthy period, the results could not be fairly brought into comparison with the preceding nor with those of previous periods for the same Command, and we have therefore omitted them.

There has been a marked decrease in the mean daily sick and the average sick time to each soldier in Gibraltar, but an increase of three days in the duration of cases, a result which would lead to the inference that the reduction in the admissions into hospital which was noticed in the preceding pages had taken place chiefly in cases of a trivial character which require a very few days of treatment.

The results for Malta closely approximate the average of the five preceding years, the only marked difference being the reduction of one day in the duration of the cases. They may, however, have been influenced by the increase to the Force employed in Malta, on the evacuation of the Ionian Islands, having taken place at the commencement of the season when the admissions are usually much in excess of the average; but for this circumstance it is probable the mean daily sick would, as in Gibraltar, have been below the previous average.

Section IV.

On the Influence of Age on the Mortality.

The ratio of mortality at each quinquennial period of life during 1864 and the four preceding years is shown in the following Table. The numbers serving and deaths at each age in 1864 are stated in Abstract No. XI of Appendix.

	Ratio of Deaths per 1,000 of Strength at each Period of Life.					
	Under 20.	20-24.	25-29.	30-34.	35-39.	40 and upwards.
Mediterranean Commands 1864	6·31	4·61	4·67	6·12	29·27	24·69
Mediterranean Commands 1859-63	6·63	7·03	10·68	12·07	15·85	23·95

The results for 1864 are somewhat irregular, probably owing to the limited numbers under observation. Those for the five preceding years show a more rapidly progressive increase in the mortality with the advance of age than is observed among the civil population of the United Kingdom. The number serving above 40 is so small that the results for that period of life may be fairly left out of consideration.

III.—ON THE HEALTH OF THE TROOPS SERVING IN BRITISH AMERICA.

Section I.

Sickness and Mortality.

I. Bermuda.

Bermuda.

In the beginning of the year the Force employed in the Bermudas consisted of two batteries of the 15th Brigade Royal Artillery, two companies of Royal Engineers, and the 39th Regiment. In the middle of July the 2nd Battalion 2nd Regiment arrived from Gibraltar to relieve the 39th, which sailed for England on the 26th of the same month.

In consequence of the prevalence of yellow fever as an epidemic, on the 10th of September 200 men of the 2nd Regiment, and on the 24th of the same month, 72 men of the Royal Artillery, 67 of the Royal Engineers, and 50 more of the 2nd Regiment, left the Islands for Nova Scotia where they remained till the end of the year. As several cases of yellow fever occurred among these men after they had left Bermuda, though obviously contracted there, we have judged it best to include these detachments in this portion of the Report rather than with the troops in Nova Scotia, where, although they were stationed for nearly three months, they cannot be said to have formed part of the regular force employed.

The average strength of the troops during the year, including these detachments, was 1,097; the admissions into hospital among them were 1,071, and the deaths were 186, inclusive of two invalids who died in England while awaiting their discharge. These numbers give the annual ratios of 976 admissions, and 169·54 deaths per 1,000 of the mean strength.

The following Table shows the influence of the different classes of diseases in causing the admissions into hospital and deaths. The details for 1864 will be found in Abstract No. XII of Appendix.

Bermuda.

Orders.	Diseases.	Average Annual Strength. In Bermuda 983. Admitted.	In Bermuda 983. Died.	Detachment in Nova Scotia 114. Admitted.	Detachment in Nova Scotia 114. Died.	Died of Invalids.	Total 1,097 Admitted.	Total 1,097 Died.	Ratio per 1,000 of mean Strength. 1864. Admitted.	1864. Died.	1859—63. Admitted.	1859—63. Died.
	Class I.											
1	Miasmatic Diseases ..	565	171	28	4	..	593	175	540·6	159·53	204·7	·90
2	Enthetic „ ..	48	..	7	..	..	55	..	50·1	..	60·2	..
3	Dietic „ ..	46	..	..	..	..	46	..	41·9	..	29·9	·36
4	Parasitic „ ..	3	..	..	..	..	3	..	2·7	..	5·2	..
	Class II.											
1	Diathetic Diseases ..	4	..	1	..	..	5	..	4·6	..	2·7	·18
2	Tubercular „ ..	11	2	1	..	2	12	4	10·9	3·64	10·2	2·33
	Class III. Diseases of the—											
1	Nervous System ..	22	..	..	..	..	22	..	20·1	..	26·0	2·68
2	Circulatory „ ..	7	3	..	..	..	7	3	6·4	2·73	4·6	1·07
3	Respiratory „ ..	25	..	4	1	..	29	1	26·4	·91	50·9	·54
4	Digestive „ ..	40	2	7	..	..	47	2	42·9	1·82	57·0	·90
5	Urinary „ ..	1	..	..	..	..	1	..	·9	..	1·4	..
6	Reproductive „ ..	14	..	..	..	..	14	..	12·8	..	8·8	..
7	Locomotive „ ..	1	..	..	..	..	1	..	·9	..	2·9	..
8	Integumentary „ ..	94	..	12	..	..	106	..	96·6	..	96·0	..
	Class IV.											
4	Diseases of Nutrition	2	..	..	..	..	2	..	1·8	..	2·1	..
	Class V.											
1	Accidents	107	1	16	..	..	123	1	112·1	·91	81·0	1·61
4	Suicide	..	..	..	..	..	..	..	..	..	..	1·07
6	Corporal Punishment	3	..	2	..	..	5	..	4·6	..	1·2	..
	Diseases not specified	..	..	..	..	..	..	..	..	..	2·0	..
	No appreciable disease	..	..	..	..	..	..	..	..	..	·5	..
	Total.. ..	993	179	78	5	2	1071	186	976·3	169·54	647·8	11·64

The admissions into hospital in 1864 have been one half higher than the average of the five preceding years, and the mortality has been enormously in excess of it. This was the result of an epidemic of yellow fever, which broke out in the Islands in July.

Miasmatic Diseases.—It was in this class chiefly that the excess occurred. The following Table shows the admissions and deaths by the principal groups of diseases comprised in it :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength. 1864. Admitted.	1864. Died.	1859-63. Admitted.	1859-63. Died.
Paroxysmal Fevers..	2	..	1·8	..	1·8	·18
Continued „	13	..	11·8	..	75·9	·54
Yellow Fever	495	175	451·2	159·53	..	..
Dysentery, Diarrhœa, and Cholera ..	27	..	24·6	..	49·6	·18
Sorethroat and Influenza	14	..	12·8	..	15·2	..
Ophthalmia..	18	..	16·4	..	32·9	..
Rheumatism	18	..	16·4	..	24·8	..

This shows the increase in the sickness and mortality by this class of diseases to have been entirely due to yellow fever, most of the others comprised in it having been apparently in abeyance during the prevalence of the epidemic.

Before giving a brief sketch of the progress of this epidemic it may be necessary to state that on the 16th of July the 2nd Battalion 2nd Regiment from Gibraltar landed at Bermuda, seven companies being encamped at Boaz Island, adjoining Ireland Island, and the other three with Head Quarters at the Navy Tanks, about half a mile from St. George's. On the 23rd one of the companies from Boaz Island joined the Head Quarters, and on the same day the 39th Regiment marched from St. George's to Ferry Point, where it remained encamped till the 26th, when it embarked for England. On the 1st of August the Head Quarters of the 2nd Regiment moved from the Navy Tanks to Ferry Point, leaving behind a detachment of 56 men for fatigue duties.

The first case of yellow fever which occurred in Bermuda in 1864 is stated to have been on the 10th of June—the second and third cases are reported to have been on the 10th of July, one of the latter being the Senior Medical Officer of the troops; but it seems very doubtful whether it really was a case of yellow fever. The first marked case among the soldiers was that of a serjeant of the 39th Regiment at St. George's on the 19th of July, which terminated fatally on the 22nd—the day before the regiment was marched to Ferry Point. It is worthy of remark that the only other cases of yellow fever which occurred in the 39th were those of two prisoners who were left behind, and who were attacked long after the departure of the regiment.

On the 23rd of July the first case in the 2nd Regiment, and on the 24th the first in the Royal Artillery, occurred. From the beginning of August the disease spread rapidly, and it did not entirely cease among the troops till the 10th of December.

The first case of yellow fever in Boaz and Ireland Islands occurred on the 23rd of July, but the type at first was mild, and no death occurred from it till the 18th of August.

It is impossible to ascertain the number of cases and deaths among the troops at each of the stations in the islands, because a large proportion of the cases from the camps at Ferry Point and Fort Cunningham were sent for treatment to the general hospital at St. George's. We are compelled, therefore, to form them into two groups—the cases at St. George's and its outstations, and those at Boaz and Ireland Islands. The following Table shows the progress of the disease, in weekly periods, throughout Bermuda, and at each of these groups;—

Bermuda.

Week ending	St. George's, &c.		Boaz and Ireland Islands.		Total in Bermudas.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
July 22	1	1	..	..	1	1
„ 29	6	1	3	..	9	1
Aug. 5	26	7	2	..	28	7
„ 12	41	9	4	..	45	9
„ 19	66	20	12	2	78	22
„ 26	72	23	19	1	91	24
Sept. 2	69	21	20	5	89	26
„ 9	41	28	17	7	58	35
„ 16	15	6	6	3	21	9
„ 23	16	4	19	2	35	6
„ 30	5	5	22	8	27	13
Oct. 7	5	1	5	6	10	7
„ 14	3	1	2	4	5	5
„ 21	..	..	3	2	3	2
„ 28	1	..	1	..	2	..
On 4th November ..	..	1	..	..	..	1
„ 19th „ ..	1	..	..	1	1	1
„ 20th „ ..	..	..	1	..	1	..
„ 25th „ ..	..	..	..	1	..	1
„ 4th December ..	..	..	1	..	1	..
„ 10th „ ..	1	..	..	..	1	..
Total	369	128	137	42	506	170

To these must be added four cases, all of which terminated fatally, among the troops detached to Halifax.

This Table shows the disease to have attained its maximum of prevalence in the week ending 26th August, and of mortality in that ending 9th September. The remarkable decrease both in cases and deaths after the latter date was effected by the removal of 200 men of the 2nd Regiment, and a fortnight afterwards of an additional 189 men of that Corps and the Ordnance. The reduction was greater than might have been expected, judging merely by the number of men removed from exposure to the causes of disease, because those were selected for embarkation who had not had an attack of fever, and were, consequently, deemed most susceptible, the cases in which men suffered from a second attack being very rare.

In the case of an epidemic which runs its course so rapidly and with such fatal effects, and when also the number of men exposed to it varies at different periods, there is a difficulty in expressing clearly what has been its influence upon the troops. When the first case occurred among the military the strength was 1,135, exclusive of the 39th Regiment, which was removed at the commencement of the epidemic. In the 20 weeks from the 23rd July to the 10th of December there were 509 cases of yellow fever and 173 deaths,* or 448·5 cases and 152·4 deaths per 1,000 of the strength at the date of outbreak. If, however, we take the average strength of the troops during the 20 weeks, 762, instead of the numbers present at the commencement of the epidemic, the proportion of the cases will be 668, and of deaths 227 per 1,000.

But, independently of the reduction in the strength caused by the numerous deaths, two important changes took place during the 20 weeks by the embarkation of 200 men on the 10th, and of 189 on the 24th of September. The time during which the epidemic prevailed may therefore be divided into three periods, the first consisting of seven weeks, during which the whole Force was exposed to the exciting causes of the disease; the second, of two weeks, from 10th to 24th September, after the withdrawal of the first detachment; and the third, the remaining 11 weeks of its duration.

* These numbers include the four cases and deaths in the detachments sent to Halifax, but not the fatal case which occurred in the 39th prior to its embarkation.

In the following Table the average strength of the troops, and the number of cases of yellow fever and deaths are shown for each. As, however, these periods were all different, it becomes necessary, for the purpose of accurate comparison, to reduce the results to unity of time, and we have accordingly added a column showing the *annual* ratio per 1,000, or in other words, the proportion of cases and deaths, which would have occurred in each division of the Force had they all been exposed to the epidemic influence for the same time, and that time had been a year.

Period.	Average Strength.	Yellow Fever.		Ratio per 1,000 of Strength.		Annual Ratio per 1,000 of Mean Strength.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
7 Weeks, July 23 to Sept. 10.. ..	1034	402	128	388·8	123·8	2896	922·1
2 Weeks, Sept. 10 to Sept. 24.. ..	781	56	15	71·7	19·2	1869	500·7
11 Weeks, Sept. 24 to Dec. 10 ..	567	51	30	89·9	52·9	426	250·8
20 Weeks, from July 23 to Dec. 10..	762	509	173	668·0	227·0	1741	591·9

The last column in this Table shows the marked reduction in the proportion both of the cases and deaths on the removal of the first, and the still further improvement on the removal of the second detachment. The mortality in the first period was at the rate of nine-tenths, in the second of one-half, and in the third of one-fourth of the Force in a year. It must not, however, be forgotten that the men selected to be sent to Halifax were those who had not had yellow fever, and as the instances of men having a second attack were quite exceptional, this improvement must have been partly due to the absence of material upon which the exciting causes of the disease were likely to act.

In a preceding Table we have shown the cases and deaths at St. George's and Ireland Island to have been, respectively, 369, 128, 137, and 42. The average strength at St. George's during the 20 weeks of the epidemic was 500, and at Boaz and Ireland Island 262; deducting from St. George's the fatal case in the 39th, and omitting the four fatal cases in the detachments sent to Halifax as we are unable to state from which of the stations the men came, the proportion of cases per 1,000 of the strength was at St. George's 736, and at Ireland Island 523, and that of the deaths 264·0 and 160·3 respectively. It would thus appear that the disease was both much less prevalent and much less fatal at Ireland Island; at St. George's also the type of the fever seems to have been more malignant, one in 2·90 of the cases having died there, while one in 3·26 was the proportion at Ireland Island.

Deputy *Inspector-General Barrow* has furnished a return of the duration of the fatal cases from which it appears that—

*1	died	on the	1st	day.	
2	„	„	2nd	„	
15	„	„	3rd	„	
26	„	„	4th	„	
30	„	„	5th	„	
26	„	„	6th	„	
24	„	„	7th	„	
14	„	„	8th	„	
10	„	„	9th	„	
6	„	„	10th	„	
7	„	„	11th	„	
2	died	on the	12th	day.	
2	„	„	13th	„	
1	„	„	14th	„	
1	„	„	16th	„	
1	„	„	17th	„	
1	„	„	19th	„	
1	„	„	26th	„	
1	„	„	29th	„	
1	„	„	41st	„	
1	„	„	51st	„	

This shows the greatest number of fatal terminations to have occurred on the fifth day.

* It is stated that this man had been ill for two days before going to hospital. It would probably be more correct, therefore, to say that he died on the 3rd day.

Bermuda. We have no information respecting the ages of the men attacked by yellow fever, but Mr. Barrow has furnished a return showing the ages of those who died and also of those who were serving in the Command at the outbreak of the epidemic to have been as follows:—

Ages.	Under 20 Years.	20 to 24.	25 to 29.	30 to 34.	35 to 39.	40 and Upwards.	Total.
Strength at each Age	32	570	405	125	24	3	1159*
Deaths by Yellow Fever.. ..	..	19	131	19	3	1	173
Ratio of Deaths per 1,000 of Strength	..	33·3	323·5	132·0	125·0	333·3	

This shows the mortality to have fallen most heavily on the men between 25 and 30 years of age, but the numbers are too small to justify any positive deductions from this result.

Our remarks have hitherto been confined to the prevalence of the disease among the non-commissioned officers and men. On the outbreak of the epidemic there were 58 officers serving in the Command, exclusive of those of the 39th Regiment, and during its progress 10 medical officers joined, 9 from Halifax and 1 from England. Among these 68 officers 40 cases of yellow fever occurred, of which 13† terminated fatally, being in the ratio giving of 588 cases and 191·2 deaths per 1,000, or 140 cases and 38·8 deaths per 1,000 more than among the men. If the officers be divided into those of the staff and departments, exclusive of medical staff; regimental officers, exclusive of surgeons and assistant-surgeons; and medical officers, staff and regimental, the mortality in the groups respectively was—

	Strength on outbreak of Disease.	Died of Yellow Fever.	Proportion of Deaths to Strength.
1. Staff and Departments	16	3	1 in 5⅓
2. Regimental Officers	37	6	1 „ 6⅙
3. Medical Officers	5		
And those who joined during the Epidemic	10	4	1 „ 3¾

So that the medical officers suffered more in proportion to their numbers than either of the other classes.

The high rate of mortality among the officers is attributed by Mr. Barrow to the circumstance of the majority of them living at St. George's, where the disease was most virulent.

In a return furnished by Mr. Barrow it is shown that at the commencement of the epidemic there were present 85 women and 134 children, that of the former 32 were attacked with yellow fever and 5 died, and of the latter 38 and 4. These numbers give the ratios of 384 cases and 60·05 deaths per 1,000 among the women, and 284 and 29·85 per 1,000 among the children, both of which are much lower than among either officers or men.

It has not been deemed necessary in this Report to enter into a detail of the sanitary measures adopted during the prevalence of the epidemic. For

* In this number are included 24 men of other corps who embarked for England with the 39th Regiment. We have no means of separating them; but their retention in the return cannot sensibly affect the result.

† The death of Staff Surgeon-Major Franklyn has not been included, because it appears extremely doubtful whether he had suffered from an attack of yellow fever, and his death, which took place on board ship, was reported to have been caused by abscesses.

these, and all information respecting the evidence as to the origin of the epidemic, the reader is referred to Mr. Barrow's special report published in the Army Medical Department Reports for 1863, page 290. *Bermuda.*

DIETIC DISEASES, though rather lower than in 1863, were considerably above the average of the five years. The admissions were all under the head of intemperance (*ebriositas*), and upwards of half of them occurred in the 39th Regiment during the first six months of the year.

The admissions by ACCIDENTS were also considerably above the average, perhaps occasioned by the numerous movements of the troops. Almost all the other classes of diseases gave rise to considerably less inefficiency than usual.

II. NOVA SCOTIA AND NEW BRUNSWICK.

Nova Scotia and New Brunswick.

No change took place during the year in the composition of the Force, with the exception of the arrival of detachments of Royal Artillery and Engineers and of the 2nd Battalion 2nd Foot from Bermuda. The details of these detachments have been kept separate from those of the Force employed in this Command, as already explained in the Report on Bermuda.

The average strength of the troops during the year was 2,991; the admissions into hospital among them amounted to 1,808, and the deaths to 25, of which 5 occurred out of hospital and 3 among invalids sent home for discharge. These numbers give the proportion of 604 admissions, and 8·36 deaths per 1,000 of mean strength, both slightly in excess of the results of the preceding year.

The sickness and mortality was distributed as follows among the different corps:—

Corps.	Average Annual Strength.	Admitted into Hospital.	Died.				Ratio per 1,000 of Strength.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery.. ..	512	308	1	2	..	3	602	5·86
„ Engineers ..	225	149	1	..	..	1	662	4·44
1st Batt. 15th Regiment	720	508	6	..	2	8	706	11·11
2nd „ 16th „	759	434	5	2	..	7	632	9·22
2nd „ 17th „	774	359	4	1	1	6	464	7·75

The diseases by which the admissions into hospital and deaths were caused are stated in Abstract No. XII of Appendix, from which the following Table has been framed:—

Nova Scotia and New Brunswick.

Orders.	Diseases.	1864. Mean Strength, 2,991. Admissions.	Deaths. In Nova Scotia.	Deaths. Of Invalids.	Deaths. Total.	Annual Ratio per 1,000 of Strength. Admitted.	Died.	1859–63. Annual Ratio per 1,000 of Strength. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	465	3	..	3	155·5	1·00	122·7	·59
2	Enthetic „ ..	442	..	..	..	147·8	..	130·2	..
3	Dietic „ ..	51	1	..	1	17·1	·34	12·2	·59
4	Parasitic „ ..	42	..	..	..	14·0	..	12·2	..
	Class II.								
1	Diathetic Diseases ..	4	..	..	..	1·3	..	·8	·17
2	Tubercular „ ..	20	5	1	6	6·7	2·00	11·6	1·86
	Class III. Diseases of the—								
1	Nervous System ..	37	1	1	2	12·4	·67	12·6	·59
2	Circulatory „ ..	13	4	1	5	4·3	1·67	3·1	·93
3	Respiratory „ ..	96	3	..	3	32·1	1·00	59·8	1·02
4	Digestive „ ..	61	1	..	1	20·4	·34	32·0	·42
5	Urinary „ ..	2	..	..	..	·7	..	2·2	..
6	Reproductive „ ..	31	..	..	..	10·4	..	3·6	..
7	Locomotive „ ..	4	..	..	..	1·3	..	2·4	..
8	Integumentary „ ..	278	..	..	..	92·9	..	78·1	..
	Class IV.								
4	Diseases of Nutrition ..	4	..	..	..	1·3	..	·5	..
	Class V.								
1	Accidents	249	3	..	3	83·3	1·00	89·9	1·27
3	Homicide	..	1	..	1	..	·34	..	·09
4	Suicide	..	..	..	..	..	..	..	·09
6	Corporal Punishment ..	9	..	..	..	3·0	..	1·4	..
	No appreciable disease..	..	..	..	..	..	..	·1	..
	Diseases not stated ..	..	..	..	..	..	..	1·8	..
	Total	1,808	22	3	25	604·5	8·36	577·2	7·62

The admissions and deaths have been slightly above the average; the increase has been chiefly in miasmatic and venereal diseases and in those of the integumentary system, while there has been a decrease in the diseases of the respiratory and digestive systems.

MIASMATIC DISEASES, when subdivided into groups, give the following results:—

Nova Scotia and New Brunswick.

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1864. Admitted.	1864. Died.	1859-63. Admitted.	1859-63. Died.
Eruptive Fevers	1	..	·3	..	1·2	·08
Paroxysmal „	2	..	·7	..	1·4	..
Continued „	33	1	11·0	·33	11·7	·34
Dysentery, Diarrhœa, and Cholera	35	1	11·7	·33	13·8	..
Sorethroat and Influenza	176	..	58·8	..	39·2	..
Ophthalmia	112	..	37·4	..	15·2	..
Rheumatism	67	..	22·4	..	30·7	..

The diseases in which the excess has occurred are *sorethroat and influenza* and *ophthalmia*; the latter was almost entirely confined to the 1st Battalion 15th Regiment. No special reason could be assigned for its prevalence in this more than any other corps. The excess of *sorethroat and influenza* occurred in the 2nd Battalion 16th Regiment, which furnished more than half the admissions under this head. No explanation is given of the cause of this by the medical officer.

Diseases of the RESPIRATORY and DIGESTIVE SYSTEMS have been considerably under, and those of the INTEGUMETARY SYSTEM above, the average of the five preceding years.

VIOLENT DEATHS.—The death returned as homicidal was that of a gunner of the Royal Artillery, who died suddenly in the barrack-room, and was supposed to have been poisoned by a woman with whom he had been keeping company, and who was jealous of him.

The other diseases do not seem to require special remark.

III. CANADA.

Canada.

In the end of June the 1st Battalion 25th Regiment arrived from Malta, and relieved the 62nd Regiment, which returned home. In the end of August, also, the 3rd Battalion Military Train, the 1st Battalion Grenadier Guards, and the 1st Battalion Scots Fusilier Guards, embarked for England, on a reduction of the Force in the Command.

The average strength of the troops during the year was 9,724, the admissions into hospital were 6,850, and the deaths 113, of which 64 occurred in hospital, 41 out of hospital, and 8 among invalids sent to England. These numbers give the ratio of 704 admissions and 11·62 deaths per 1,000 of mean strength; both slightly in excess of the proportion in 1863.

The sickness and mortality in the different corps were as follows:—

Canada.

	Annual Average Strength.	Admitted into Hospital.	Deaths.				Annual ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery ..	1,718	1,394	11	13	2	26	811	15·13
Military Train ..	189	178	1	..	..	1	941	5·29
1st Batt., Grenadier Guards	517	368	1	2	..	3	712	5·80
1st Batt., Scots Fusilier Guards ..	499	279	1	1	1	3	559	6·01
1st Batt., 16th Regt...	682	580	7	..	2	9	852	13·20
1st Batt., 17th Regt..	671	461	5	2	..	7	687	10·43
1st Batt., 25th Regt..	372	288	1	2	..	3	774	8·06
30th Regiment ..	675	511	6	1	..	7	757	10.37
47th Regiment ..	652	413	4	1	3	8	633	12·27
4th Batt., 60th Regt.	746	437	5	2	..	7	586	9·38
62nd Regiment ..	376	203	3	..	..	3	540	7·98
63rd Regiment ..	666	589	2	3	..	5	884	7·51
1st Batt., Rifle Brig..	663	388	7	5	..	12	585	18·10
Royal Canadian Rifles.	1,214	546	10	6	..	16	450	13·17

The other deaths were three of the Royal Engineers, and two of the Commissariat Staff Corps.

The high ratio of mortality in the Royal Artillery arose from eight men having been killed by an explosion of a powder magazine at Quebec, and three having been accidentally drowned. The high ratio in the Rifle Brigade and Royal Canadian Rifles is also partly due to deaths by drowning.

The diseases by which the sickness and mortality were caused are stated in Abstract No. XII of Appendix. The results are shown in the following Table:—

Orders.	Diseases.	Strength, 9,724. Admissions.	Deaths. In Canada.	Deaths. Of Invalids.	Deaths. Total.	Annual Ratio per 1,000. 1864. Admissions.	1864. Deaths.	1859-63. Admissions.	1859-63. Deaths.
	Class I.								
1	Miasmatic Diseases ..	1,192	12	1	13	122·6	1·34	130·0	1·00
2	Enthotic „	2,003	..	..	..	206·0	..	153·7	·03
3	Dietic „	191	3	..	3	19·6	·31	18·7	·17
4	Parasitic „	54	..	..	..	5·6	..	5·8	..
	Class II.								
1	Diathetic Diseases	38	..	..	..	3·9	..	2·0	..
2	Tubercular „	120	22	6	28	12·3	2·88	7·6	1·47
	Class III. Diseases of the								
1	Nervous System	133	9	..	9	13·7	·93	15·7	1·27
2	Circulatory „	47	13	1	14	4·8	1·44	3·4	·94
3	Respiratory „	548	6	..	6	56·3	·62	67·3	1·27
4	Digestive „	375	3	..	3	38·6	·31	34·4	·43
5	Urinary „	16	2	..	2	1·6	·20	2·2	·20
6	Reproductive „	77	..	..	..	7·9	..	6·3	..
7	Locomotive „	29	2	..	2	3·0	·20	3·5	..
8	Integumentary „	994	..	..	..	102·2	..	92·2	·07
	Class IV.								
4	Diseases of Nutrition ..	13	..	..	..	1·3	..	·7	..
	Class V.								
1	Accidents	995	30	..	30	102·3	3·08	97·5	1·97
3	Homicide	..	..	..	..	..	..	..	·13
4	Suicide	4	3	..	3	·4	·31	·1	·27
5	Execution	..	..	..	..	..	..	..	·03
6	Corporal Punishment ..	15	..	..	..	1·6	..	1·0	..
	No appreciable disease ..	6	..	..	..	·6	..	..	..
	Diseases not specified ..	..	..	..	..	..	..	·8	..
	Total	6,850	105	8	113	704·3	11·62	642·9	9·25

The increase in the ratio of admissions into hospital has been chiefly in venereal diseases, and of deaths, in tubercular diseases and those from accidents.

Miasmatic Diseases, when subdivided, furnish the following results:—

Canada.

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1864. Admitted.	1864. Died.	1859-63. Admitted.	1859-63. Died.
Eruptive Fevers	75	3	7·7	·31	2·6	·03
Paroxysmal „	65	3	6·7	·31	5·8	·07
Continued „	163	4	16·8	·41	18·8	·10
Dysentery, Diarrhœa, and Cholera ..	167	1	17·2	·10	25·0	·03
Sorethroat and Influenza	298	..	30·6	..	28·1	..
Ophthalmia	126	..	13·0	..	14·7	..
Rheumatism	206	..	21·2	..	25·8	·07

Eruptive Fevers have been unusually prevalent and fatal. Small-pox prevailed as an epidemic among the civil population at Hamilton and Montreal, and at both stations extended to the troops—at the latter, chiefly to the Artillery, and at the former to the Rifle Brigade. Among the whole Force 50 cases occurred, of which two died: they are all stated to have borne marks of vaccination. Scarlet Fever was also very prevalent at these two stations, but only 18 cases and one death occurred among the troops.

Dysentery and Diarrhœa were considerably under the previous average.

Accidental and Violent Deaths were unusually numerous. The excess was caused by nine resulting from an explosion of a powder magazine at Quebec, in March. Eight of the men killed were of the Royal Artillery, and one of the 16th Regiment. Eighteen deaths by drowning are recorded, being in excess of the number in the preceding year. The importance of teaching the soldiers to swim, wherever facilities exist for doing so, is too obvious to require comment.

The other classes of diseases differ so little from the average of previous years that it seems unnecessary to make any remarks upon them.

IV.—Newfoundland.

Newfoundland. The average strength of the garrison, which consisted of a battery of Royal Artillery and two companies of the Royal Canadian Rifles, was 302: the admissions into hospital were 98, and the deaths 2. These numbers give the proportion of 324 admissions and 6·62 deaths per 1,000 of mean strength.

The diseases by which the sickness and mortality were caused are stated in Abstract No. XII of Appendix. The classified results are shown in t following Table:—

Newfoundland

Orders.	Diseases.	Strength, 302.				Annual Ratio per 1,000.			
		Admissions.	Died.			1864.		1859-63.	
			In Newfoundland.	Of Invalids.	Total.	Admissions.	Deaths.	Admissions.	Deaths.
	Class I.								
1	Miasmatic Diseases	21	..	..	..	69·5	..	297·3	..
2	Enthetic „	4	..	..	..	13·3	..	39·6	..
3	Dietic „	9	..	..	..	29·8	..	33·0	·33
4	Parasitic „	..	..	..	..	..	..	5·0	..
	Class II.								
1	Diathetic Diseases	..	..	..	..	..	..	5·8	..
2	Tubercular „	1	..	..	..	3·3	..	9·1	1·65
	Class III. Diseases of the—								
1	Nervous System	8	..	..	..	26·5	..	41·3	1·65
2	Circulatory „	..	..	..	..	..	..	19·8	..
3	Respiratory „	14	2	..	2	46·4	6·62	97·4	1·65
4	Digestive „	4	..	..	..	13·2	..	49·6	..
5	Urinary „	..	..	..	..	..	..	2·5	..
6	Reproductive „	1	..	..	..	3·3	..	3·3	..
7	Locomotive „	..	..	..	..	..	..	9·9	..
8	Integumentary „	16	..	..	..	53·0	..	55·3	..
	Class IV.								
4	Diseases of Nutrition	..	..	..	..	..	..	..	..
	Class V.								
1	Accidents	20	..	..	..	66·2	..	131·3	..
4	Suicide	..	..	..	..	..	..	..	..
6	Corporal Punishment	..	..	..	..	..	..	3·3	..
	Diseases not stated	..	..	..	..	..	..	4·1	..
	Total	98	2	..	2	324·5	6·62	807·6	5·78

Although the admissions have been greatly below the average of the preceding five years, the reduction has been much less, compared with the proportion in 1863. As was pointed out in the Report for that year, the decrease was attributable to the change in the composition of the Force occasioned by the reduction of the Royal Newfoundland Companies, and the employment in their stead of a detachment of the Royal Canadian Rifles. Compared with 1863, there has been a considerable reduction in venereal diseases, and in accidents, but diseases of the respiratory and integumentary systems have been more prevalent. As the Force was so small and so healthy, any lengthened observations on the various classes of diseases seem unnecessary. The remarkable exemption from venereal affections is to be attributed to the large proportion of married men in the Canadian Rifles.

Section II.

On the Extent of Invaliding.

British America.

During the year, 27 men were sent to England as invalids from Bermuda, and 248 from Canada, Nova Scotia, and Newfoundland, being respectively in the ratio of 24·6 and 19·1 per 1,000 of the strength. During the same period,

British America. 15 invalids from Bermuda and 107 from British America were finally discharged the service at Netley, and 32 were discharged in America. The disabilities of the invalids are stated in Abstract No. XIII of Appendix, from which the following summary has been framed.

	Invalids sent home		Invalids Discharged the Service		
			In England, sent from		In British America.
	From Bermuda	From British America.	Bermuda	British America.	
Miasmatic Diseases	6	24	1	4	2
Enthetic „	1	16	2	4	..
Diathetic „	..	..	..	3	..
Tubercular „	4	80	3	49	13
Diseases of the—					
Nervous System	4	24	2	10	3
Circulatory „	1	19	1	8	4
Respiratory „	1	25	..	9	2
Digestive „	2	14	1	4	4
Urinary „	..	3	..	1	..
Reproductive „	..	2	..	1	..
Locomotive „	1	5	1	5	..
Integumentary „	..	13	..	3	2
Diseases of Nutrition	..	2	1	1	..
Accidents and Violence	7	13	3	5	2
Not specified	..	8	..	..	..
Total	27	248	15	107	32
Ratio per 1,000 of Mean Strength { 1864	24·6	19·1	13·7	8·2	2·5
{ 1859–63	17·0	17·1	10·0	10·7	1·8

The proportion has not varied much from the average, except in Bermuda, where an unusual number was invalided to England on account of accidents and violence. The chief cause of invaliding from British America was consumption. Chronic bronchitis, chronic rheumatism, valvular disease of the heart, and venereal diseases, rank next in frequency.

Section III.

Mean Daily Sick.

The average daily sick during the year in Bermuda, including the detachments sent to Halifax, was 79; in Nova Scotia and New Brunswick, 82; in Canada, 299; and in Newfoundland, 7·6. From these numbers the following results have been calculated:—

	Bermuda.		Nova Scotia and New Brunswick.		Canada.		Newfoundland.	
	1864.	1859-63.	1864.	1859-63.	1864.	1859-63.	1864.	1859-63.
Ratio per 1,000 of strength constantly sick ..	72·01	30·99	27·42	25·76	30·74	29·36	18·54	34·68
Average sick time to each soldier	days 26·29	days 11·31	days 10·01	days 9·40	days 11·22	days 10·72	days 6·77	days 12·66
Average duration of the cases of disease	26·92	17·47	16·55	16·33	15·93	16·67	20·86	15·67

There has been a very great increase in all these particulars in Bermuda, owing to the epidemic of yellow fever; and there has been a marked reduction in the average number sick and the sick time to each soldier in Newfoundland, but an increase in the duration of the cases. The latter result has probably arisen from the reduction in the admissions into hospital having been chiefly in trifling cases, which usually require but little treatment.

Section IV.

Influence of Age on the Mortality.

The following Table shows the proportion of deaths in each quinquennial period of life among the troops in the Bermudas and in the British American Commands. The details for 1864 are given in Abstract No. XIV of Appendix.

Stations.	Ratio of Deaths per 1,000 of Strength at each age.					
	Under 20.	20–24.	25–29.	30–34.	35–39.	40 and upwards.
Bermuda	76·92	148·94	138·46	219·51	176·47	..
Canada, Nova Scotia, New Brunswick, and Newfoundland ..	2·11	8·43	13·95	11·03	16·37	22·30
Total 1864 ..	4·03	13·79	21·19	15·88	19·73	22·06
Total 1859–63 ..	1·82	6·62	10·00	10·78	16·43	14·95

The high ratios for 1864 depend, of course, on the epidemic at Bermuda. In consequence of the two Line regiments having each been there during a portion of the year only, the information for that Command has been derived exclusively from the returns of the Ordnance Corps. The reduction in the death rate at the ages 25-29, which occurs in them, was not observed in the 2nd Foot. On the average of the preceding five years there is a break at the ages 30-34 in the progressive increase of the mortality, although the

British America. ratio is slightly above that of the ages 25-29. This corresponds with the results obtained in most of the other foreign stations and, as before explained, is probably due to the operation of the Limited Enlistment Act.

IV.—ON THE HEALTH OF THE TROOPS SERVING IN THE WEST INDIES.

Section I.
Sickness and Mortality.

Windward and Leeward Command.

I. Windward and Leeward Command.

1. White Troops.

In April the detachment of the 1st Battalion 14th Regiment at Trinidad was relieved by a detachment of the 2nd Battalion 6th Regiment from the Ionian Islands, and in July the 1st Battalion 21st Foot embarked at Barbadoes for England on the arrival of the 2nd Battalion 3rd Foot from Gibraltar.

The average strength of the white troops during the year was 1,090, the admissions into hospital were 1,644, and the deaths 17, of which one occurred out of hospital and two among invalids sent home for discharge. These numbers give the proportion of 1,508 admissions and 15·60 deaths per 1,000 of mean strength—both being one half higher than in 1863.

The influence of the different classes of diseases in causing this sickness and mortality is shown in the following Table compiled from Abstract No. XV of Appendix and from previous Reports:—

Windward and Leeward Command.

Orders.	Diseases.	1864. Strength, 1,090. Admitted.	Died. In the Command.	Died. Of Invalids.	Died. Total.	1864. Ratio per 1,000. Admitted.	1864. Ratio per 1,000. Died.	1859–63. Ratio per 1,000. Admitted.	1859–63. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases. ..	809	6	..	6	742·2	5·50	500·0	3·89
2	Enthetic „	273	..	..	..	250·5	..	115·2	..
3	Dietic „	41	1	..	1	37·6	·92	26·4	·16
4	Parasitic „	6	..	..	..	5·5	..	4·1	..
	Class II.								
1	Diathetic Diseases . ..	4	..	..	..	3·7	..	6·6	..
2	Tubercular „	9	2	2	4	8·3	3·67	9·9	1·30
	Class III. Diseases of the—								
1	Nervous System ..	25	3	..	3	22·9	2·75	35·2	2·11
2	Circulatory „	13	1	..	1	11·9	·92	4·4	·65
3	Respiratory „	44	..	..	..	40·4	..	34·4	·49
4	Digestive „	69	1	..	1	63·3	·92	69 8	·65
5	Urinary „	1	..	..	..	·9	..	·5	..
6	Reproductive „	26	..	..	..	23·9	..	16·4	..
7	Locomotive „	3	..	..	..	2·7	..	4·4	..
8	Integumentary „	196	..	..	..	179·8	..	159·1	..
	Class IV.								
4	Diseases of Nutrition ..	10	..	..	..	9·2	..	1·3	..
	Class V.								
1	Accidents	113	..	..	..	103·7	..	96·7	·65
4	Suicide	1	1	..	1	·9	·92	·6	·65
6	Corporal Punishment ..	1	..	..	..	·9	..	2·1	..
	Diseases not stated. ..	..	..	..	..	..	..	3·6	..
	Total	1,644	15	2	17	1508·0	15·60	1090·7	10·55

The excess of the admissions over the average has been chiefly caused by miasmatic and venereal, and of the deaths, by miasmatic and tubercular diseases.

MIASMATIC DISEASES when subdivided give the following results :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1864. Admitted.	1864. Died.	1859–63. Admitted.	1859–63. Died.
Eruptive Fevers	..	..	..	..	1·9	..
Paroxysmal „	442	1	405·5	·92	265·1	3·41
Continued „	181	4	166·1	3·67	32·9	·16
Dysentery, Diarrhœa, & Cholera	64	1	58·7	·92	47·2	..
Sorethroat and Influenza ..	17	..	15·6	..	10·7	·16
Ophthalmia	61	..	56·0	..	106·5	..
Rheumatism	27	..	24·8	..	24·8	..

It will be seen that the difference both in admissions and deaths has been almost entirely due to paroxysmal and continued fevers, which prevailed to a great extent, both in Barbadoes and Demerara. In Barbadoes the men of the 2nd Battalion 3rd Regiment enjoyed a marked exemption till

Windward and Leeward Command.

the end of October, when an epidemic of remittent fever broke out among them, and was the cause of 182 admissions into hospital in November and 133 in December. Fortunately the type of disease was mild and none of the cases died. Officers, men, women, and children were alike subject to it. The Royal Artillery also were affected by the epidemic, but by no means to so great an extent as the 3rd Regiment.

The epidemic was attributed by the Surgeon of the Regiment to atmospheric causes. The atmosphere is stated to have been very oppressive, and to have been saturated with moisture; there were frequent heavy falls of rain accompanied with cold winds, and succeeded quickly by a hot scorching sun; the winds were light and variable, mostly from the south-west, and there were frequent calms. Early in December the trade winds set in from the N.E. About the middle of the month the rains ceased, and by the 20th the epidemic had entirely disappeared. These views, however, are not borne out by the results of meteorological observations, which show the humidity and rain-fall to have been less in October and November than in the four preceding months.

At Demerara fever was prevalent during the latter half of the year. In August yellow fever broke out among the shipping, and upwards of 400 cases were treated, of which above 100 died. Only one case, which, however, was fatal, occurred among the military, the patient being a Barrack Serjeant. In August, September, and October the admissions by continued fever were numerous in the detachment of the 3rd Regiment. Its prevalence was attributed by the medical officer in charge to the effects of a tropical climate on the men who arrived there at the season when diseases produced by miasmata are most rife, to the insanitary condition of George Town, and to the cheapness of intoxicating liquors.

Ophthalmia has been less prevalent than in 1863 and much under the average of the four preceding years, though the ratio of admissions from it is still high.

Enthetic Diseases have given rise to more than double the average proportion of admissions. The increase was confined to the troops at Barbadoes, and occurred principally after the 21st had been relieved by the 3rd Regiment.

The other diseases do not appear to require special notice.

The admissions into hospital and deaths at each of the subordinate stations are detailed in Abstract No. XV of Appendix, and the results are shown in the following Table:—

Windward and Leeward Command.

Orders.	Diseases.	Ratio per 1,000 of Mean Strength in 1864.					
		Barbadoes.		Trinidad.		British Guiana.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.						
1	Miasmatic Diseases ..	735·6	1·36	412·8	4·26	1400·0	32·00
2	Enthetic „ ..	342·5	..	63·8	..	64·0	..
3	Dietic „ ..	16·4	..	93·6	..	56·0	8·00
4	Parasitic „ ..	5·5	..	..	..	16·0	..
	Class II.						
1	Diathetic Diseases ..	2·7	..	4·3	..	8·0	..
2	Tubercular „ ..	6·9	1·36	12·8	4·26	8·0	..
	Class III.						
	Diseases of the—						
1	Nervous System ..	16·4	..	38·3	..	32·0	24·00
2	Circulatory „ ..	15·1	..	8·5	4·26	..	..
3	Respiratory „ ..	31·5	..	63·8	..	48·0	..
4	Digestive „ ..	61·6	..	76·6	4·26	48·0	..
5	Urinary „ ..	..	..	4·3	..	..	..
6	Reproductive „ ..	27·4	..	17·0	..	16·0	..
7	Locomotive „ ..	2·7	..	4·3	..	..	..
8	Integumentary „ ..	143·8	..	238·3	..	280·0	..
	Class IV.						
4	Diseases of Nutrition.	5·5	..	25·5	..	..	..
	Class V.						
1	Accidents	109·6	..	85·1	..	104·0	..
4	Suicide	1·4	..	..	4·26	..	..
6	Corporal Punishment .	1·4	..	..	..	..	..
	Total ..	1526·0	2·72	1149·0	21·30	2080·0	64·0
	Ratio per 1,000 in 1859–63 ..	1033·7	7·71	1153·1	23·19	1292·0	5·46

This Table shows the admissions in Barbadoes to have been greatly in excess of the average, but the deaths to have been remarkably low. In Trinidad the ratios have been very near the average, while in British Guiana both sickness and mortality have been extremely high.

One of the causes assigned for the very sickly state of the troops in Demerara was, that early in July an extensive fire occurred in Water Street, George Town, in which great quantities of rice, sugar, beef, pork, and grain were destroyed; that no efforts were made to remove the half burnt remains, which were left to putrify in the hot sun, and the smell from them is described as having been very offensive. Measures were taken to prevent, as far as possible, the troops from going into this part of the town, but of course these could only be partially successful. To this source of disease the medical officers are disposed to attribute the severe epidemics of fever which prevailed among the shipping and the civil population.

2. Black Troops.

Windward and Leeward Command.

In the beginning of September a large detachment of men of the 2nd West India Regiment arrived at Barbadoes from Western Africa. A detachment of the 1st West India Regiment accompanied it, but was sent to join Head Quarters in Jamaica. The average strength of the black troops serving in the Command throughout the year was 677, the admissions into hospital were 635, and the deaths 14, being in the ratio of 938 and 20·69 per 1,000 of the strength, and both in excess of the proportion in 1863.

The diseases by which the admissions and deaths were caused are stated in Abstract No. XVI of Appendix. The following Table shows the classified results compared with those for the preceding five years :—

Orders.	Diseases.	1864. Strength 677. Admitted.	1864. Strength 677. Died.	1864. Ratio per 1,000. Admitted.	1864. Ratio per 1,000. Died.	1859-63. Ratio per 1,000. Admitted.	1859-63. Ratio per 1,000. Died.
	Class I.						
1	Miasmatic Diseases	135	2	199·4	2·95	278·9	4·49
2	Enthetic „	263	..	388·5	..	214·6	..
3	Dietic „	..	..	..	..	·5	..
4	Parasitic „	10	..	14·8	..	3·6	..
	Class II.						
1	Diathetic Diseases	8	..	11·8	..	4·8	·36
2	Tubercular „	17	5	25·1	7·39	15·6	5·93
	Class III. Diseases of the—						
1	Nervous System	8	..	11·8	..	16·9	1·62
2	Circulatory „	1	1	1·5	1·48	3·1	·90
3	Respiratory „	50	3	73·9	4·43	77·1	2·69
4	Digestive „	19	1	28·0	1·48	35·9	1·08
5	Urinary „	1	1	1·5	1·48	2·0	·54
6	Reproductive „	10	..	14·8	..	11·5	..
7	Locomotive „	1	..	1·5	..	3·1	..
8	Integumentary „	74	..	107·8	..	139·1	·18
	Class IV. Diseases of Nutrition	..	..	..	..	1·4	·36
	Class V.						
1	Accidents	34	1	51·7	1·48	71·0	·54
3	Homicide	..	..	..	..	·4	·54
4	Suicide	..	..	..	..	·2	·72
5	Execution	..	..	..	..	..	·18
6	Corporal Punishment	4	..	5·9	..	4·8	..
	Diseases not specified	..	..	..	..	12·0	..
	Total	635	14	938·0	20·69	896·5	20·18

The admissions and deaths have both been above the average proportion; the increase in the former has been due to the great prevalence of venereal diseases, and in the latter to pulmonary consumption and diseases of the respiratory system. There has been, however, a considerable reduction in the amount of miasmatic diseases, and those of the integumentary system, and of accidents.

Miasmatic Diseases.—The following Table shows the admissions and deaths by the principal diseases in this class :—

Windward and Leeward Command.

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Mean Strength. 1864. Admitted.	1864. Died.	1859-63. Admitted.	1859-63. Died.
Eruptive Fevers	..	..	..	..	23·7	·36
Paroxysmal „	28	1	41·4	1·48	86·6	1·80
Continued „	29	..	42·8	..	10·9	·72
Dysentery, Diarrhœa, and Cholera ..	14	1	20·7	1·48	17·9	1·08
Sorethroat and Influenza	6	..	8·9	..	23 7	..
Ophthalmia	15	..	22·2	..	23·2	..
Rheumatism	41	..	60·6	..	83·4	·36

The reduction in the prevalence of these diseases has been chiefly in *eruptive* and *paroxysmal fevers*, but it has been to a considerable extent counterbalanced by an increase in those of the *continued* type. There has also been a reduction in the cases of *sorethroat and influenza* and in *rheumatism*.

ENTHETIC DISEASES have, as with the white troops, been much more prevalent than formerly, but the increase has not been confined to Barbadoes, but has also taken place in British Guiana.

TUBERCULAR DISEASES continue to be the chief cause of mortality among the black troops. The Principal Medical Officer states that in almost all the fatal cases of other classes of diseases tubercular deposits were found to exist in the lungs.

The sickness and mortality among the black troops at the different subordinate stations are shown in the following Table, framed from Abstract No. XVI. of Appendix:—

Windward and Leeward Command.

Orders.	Diseases.	Annual Ratio per 1,000 of Strength in 1864. Barbadoes. Admitted.	Barbadoes. Died.	Trinidad. Admitted.	Trinidad. Died.	British Guiana. Admitted.	British Guiana. Died.
	Class I.						
1	Miasmatic Diseases	173·2	3·94	240·0	..	336·1	..
2	Enthetic ,, ...	452·8	..	..	..	270·1	..
4	Parasitic ,, ...	13·8	..	40·0	..	16·4	..
	Class II.						
1	Diathetic Diseases	7·9	..	..	..	32·8	..
2	Tubercular ,, ...	23·6	9·84	..	..	41·0	..
	Class III. Diseases of the—						
1	Nervous System	7·9	..	..	..	32·8	..
2	Circulatory ,, ...	2·0	..	..	..	..	8·20
3	Respiratory ,, ...	88·5	5·91	..	..	41·0	..
4	Digestive ,, ...	23·6	1·97	160·0	..	24·6	..
5	Urinary ,, ...	..	..	..	..	8·2	8·20
6	Reproductive ,, ...	17·7	..	..	..	8·2	..
7	Locomotive ,, ...	..	..	..	..	8·2	..
8	Integumentary ,, ...	120·1	..	80·0	..	90·2	..
	Class V.						
1	Accidents	35·4	..	80·0	..	114·8	8·20
6	Corporal Punishment	7·9	..	..	..	..	..
	Total ..	974·4	21·66	600·0	..	1024·4	24·60
	Average of 1859-63	1022·2	19·95	787·5	18·97	734·1	20·03

The results, except for British Guiana, do not differ materially from the average of previous years. The increase in the sickness there has been chiefly from venereal and accidents. The high rate of mortality by consumption forms, as already stated, the most striking feature in the Return.

II. Jamaica.

1. White Troops.

Jamaica. In the middle of April the 2nd Battalion 6th Regiment arrived from the Ionian Islands, and relieved the 1st Battalion 14th Regiment, which embarked for England.

The average strength of the white troops in the Island during the year was 677; the admissions into hospital amounted to 755, and the deaths to 5, all of them in hospital; no deaths occurred among the invalids sent to England. These numbers give the ratios of 1,115 admissions, and 7·35 deaths per 1,000 of mean strength, the former being considerably above, and the latter 2·33 per 1,000 below the proportion in 1863.

The diseases by which the admissions into hospital and deaths were caused

are stated in Abstract No. XV of Appendix. The following Table shows the influence of the different classes of diseases :—

Order.	Diseases.	1864. Strength, 677. Admissions.	Deaths. In Jamaica.	Deaths. Of Invalids.	Deaths. Total.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	1859-63. Ratio per 1,000. Admitted.	1859-63. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases ..	229	..	..	..	338·3	..	337·8	6·23
2	Enthetic „ ..	107	..	..	..	158·1	..	101·7	..
3	Dietic „ ..	19	..	..	..	28·1	..	31·5	·31
4	Parasitic „ ..	23	..	..	..	34·0	..	4·4	..
	Class II.								
1	Diathetic Diseases.. ..	4	..	..	..	5·9	..	2·5	..
2	Tubercular „ ..	11	1	..	1	16·3	1·47	7·2	1·87
	Class III. Diseases of the—								
1	Nervous System ..	19	1	..	1	28·1	1·47	18·7	1·25
2	Circulatory „ ..	3	..	..	..	4·4	..	5·6	·94
3	Respiratory „ ..	15	..	..	..	22·2	..	54·3	..
4	Digestive „ ..	29	1	..	1	42·8	1·47	80·5	·94
5	Urinary „ ..	5	1	..	1	7·4	1·47	1·6	..
6	Reproductive „ ..	1	..	..	..	1·5	..	1·2	..
7	Locomotive „ ..	7	..	..	..	10·4	..	·9	..
8	Integumentary „ ..	141	..	..	..	207·8	..	135·4	..
	Class IV.								
4	Diseases of Nutrition ..	13	..	..	..	19·2	..	3·1	..
	Class V.								
1	Accidents	128	1	..	1	189·1	1·47	115·1	..
3	Homicide	..	..	..	..	..	..	..	·31
4	Suicide	..	..	..	..	..	..	·8	1·25
6	Corporal Punishment ..	1	..	..	..	1·5	..	3·7	..
	Diseases not specified ..	..	..	..	..	..	..	1·2	..
	Total	755	5	..	5	1115·1	7·35	906·7	13·10

There has been a considerable excess of admissions over the average of the five preceding years,—chiefly in venereal and parasitic diseases, in those of the integumentary system, and in accidents. The mortality has been much below the average, the difference being in the deaths by miasmatic diseases.

MIASMATIC DISEASES.—The admissions and deaths by the principal diseases in this class have been as follows :—

Jamaica.

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength.			
			1864.		1859-63.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	3	..	4·4	..	·3	..
Paroxysmal „	88	..	130·0	..	81·7	..
Continued „	29	..	42·8	..	68·3	..
Dysentery, Diarrhœa, &c. ..	43	..	63·5	..	45·8	..
Sorethroat and Influenza ..	18	..	26·6	..	13·7	..
Ophthalmia	10	..	14·8	..	100·6	..
Rheumatism	36	..	53·2	..	19·9	..

This shows a considerable excess in paroxysmal fevers, diarrhœa, and rheumatism, compared with the average of the five preceding years; but the results do not differ materially from those of 1863, except that there has been a marked reduction in ophthalmia, and increase in rheumatism.

The continued excess in the amount of paroxysmal fevers appears to have been due, as in the preceding year, to the necessity for employing a number of the European troops at Up Park Camp and at Port Royal, in consequence of the deficiency of black troops.

Ophthalmia.—The marked reduction in the prevalence of this disease has arisen, probably, from the change of regiments, as although it had undergone a gradual reduction, it still prevailed to some extent in the 14th Foot.

Enthetic Diseases have been one-half more prevalent than in 1863, a result probably also connected with the change of corps.

The increase in the admissions by diseases of the integumentary system was chiefly in cases of boils and ulcers, and under the class of accidents, by bruises, sprains, and trifling wounds. The fatal case was caused by an accident with a traction engine.

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2. Black Troops.

During the year considerable changes were made in the Force in Jamaica. The 4th West India Regiment was sent to the West Coast of Africa, being relieved by a detachment of the 2nd West India Regiment from the Windward and Leeward Command, which, towards the end of September, proceeded to Honduras on being replaced by a wing of the 1st West India Regiment from Western Africa. The 5th West India Regiment also was embodied, being formed partly by volunteers from the other regiments, and partly by African recruits. Besides these there were the additional gunners attached to the Royal Artillery.

The average strength of the black troops during the year was 616, the admissions into hospital among them were 893, and the deaths 21, the former being in the ratio of 14·50, and the latter of 34·05 per 1,000 of the strength, or both slightly in excess of the proportion in 1863.

The following Table, compiled from Abstract No. XVI of Appendix, and from previous reports, shows the influence of the different classes of diseases on the sickness and mortality of the black troops in this Command :—

Order.	Diseases.	1864. Strength, 616. Admitted.	Died at Jamaica.	1864. Ratio per 1,000. Admitted.	Died.	1859-63. Ratio per 1,000. Admitted.	Died.
	Class I.						
1	Miasmatic Diseases.. ..	368	6	597·4	9·74	441·4	6·21
2	Enthetic „	248	..	402·6	..	310·5	·89
3	Dietic „	1	..	1·6	..	2·4	..
4	Parasitic „	2	..	3·3	..	3·3	..
	Class II.						
1	Diathetic Diseases	5	1	8·1	1·62	6·2	·89
2	Tubercular „	19	3	30·8	4·87	16·3	6·21
	Class III. Diseases of the—						
1	Nervous System ..	17	2	27·6	3·24	23·7	1·77
2	Circulatory „	3	1	4·9	1·62	3·0	·89
3	Respiratory „	48	2	77·9	3·24	80·5	6·51
4	Digestive „	19	1	30·8	1·62	40·8	2·37
5	Urinary „	5	1	8·1	1·62	3·5	..
6	Reproductive „	8	..	13·0	..	10·1	..
7	Locomotive „	8	..	13·0	..	3·5	..
8	Integumentary, ...	98	..	159·1	..	117·5	·30
	Class IV.						
4	Diseases of Nutrition ..	5	1	8·1	1·62	·3	..
	Class V.						
1	Accidents	37	..	60·1	..	66·6	·89
3	Homicide	1	1	1·6	1·62	·3	·30
4	Suicide	..	1	..	1·62	..	·89
5	Execution	..	1	..	1·62	..	·30
6	Corporal Punishm ..	1	..	1·6	..	5·0	..
	Diseases not specified ..	..	..	..	..	3·3	..
	Total	893	21	1449·6	34·05	1138·2	28·42

The admissions have been 311 per 1,000 above the average of the preceding five years, the difference being principally in miasmatic and venereal diseases, and in those of the integumentary system. The mortality also has been nearly six per 1,000 above the average, one-half of the excess having been caused by miasmatic diseases.

MIASMATIC DISEASES when subdivided into groups give the following results:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Mean Strength. 1864. Admitted.	Died.	1859-63. Admitted.	Died.
Eruptive Fevers	20	3	32·5	4·87	6·2	..
Paroxysmal „	220	2	357·1	3·24	269·9	3·26
Continued „	..	..	..	..	19·8	1·48
Dysentery, Diarrhœa, and Cholera	23	..	37·3	..	23·4	1·18
Sorethroat and Influenza	32	..	51·9	..	31·7	..
Ophthalmia..	11	..	17·9	..	20·7	..
Rheumatism	56	..	90·9	..	66·8	·30

Jamaica. ***Eruptive Fevers*** have been much in excess of the average, and have been the cause of the increased ratio of mortality by miasmatic diseases. Eighteen of the admissions and all the deaths were by small-pox; seven cases and one death occurred in the detachment of the 1st West India Regiment which arrived from Western Africa and was quartered at Spanish Town, and the rest of the cases were in the 5th West India Regiment at Up Park Camp. Those in the 1st West India Regiment are stated to have all borne marks of vaccination, but no specific information on this head is given in the report of the Medical Officer in charge of the 5th West India Regiment. Small-pox prevailed to a considerable extent during the last half of the year among the black population of Spanish Town and Kingston.

Paroxysmal Fevers have been considerably in excess of the average, a result which may probably have been in a great measure due to the previous service of the men of the 1st West India Regiment on the West Coast of Africa; they have not, however, given rise to much mortality.

ENTHETIC DISEASES were the cause of a very high ratio of admissions; the proportion was much greater in the newly raised 5th West India Regiment than in any of the other corps.

VIOLENT DEATHS.—The proportion of these was very high; one of the gunners of the additional artillery was killed by a sabre wound in the abdomen, inflicted by a comrade, who was hanged for the murder; the third death under this class was that of a soldier of the 5th West India Regiment who shot himself.

The Principal Medical Officer, Dr. Bent, Deputy Inspector-General, in calling attention to the high ratio of sickness and mortality among the black troops, attributes it in a great degree to the circumstance of the 5th West India Regiment being throughout the year in course of formation, and consisting of recruits, chiefly miserable boys, half starved and half grown, to the more sickly men of the 4th West India Regiment having been left behind when that corps embarked for Western Africa, and to the effects of previous African service upon the men of the 1st West India Regiment who arrived in Jamaica in the middle of September.

III. BAHAMAS.

Bahamas. The white troops employed at Nassau consisted of a detachment of the Royal Artillery and the non-commissioned officers of the 1st West India Regiment: the average strength of the former was 13, and of the latter 12; the admissions amounted to 21 and the deaths to 2. The fatal cases were one of yellow fever in the Royal Artillery and one of *delirium tremens* in a serjeant-major of the West India Regiment.

The black troops consisted of the head quarters and four companies of the 1st West India Regiment; their average strength was 448, the admissions into hospital were 365 and the deaths 16, being in the ratio of 815 and 35·70 per 1,000 of the strength. These are greatly in excess of the results for 1863, and the mortality is also considerably above the average of the last five years.

The diseases by which this sickness and mortality were caused are stated in Abstract No. XVI of Appendix. The following Table shows the influence of the various classes of diseases upon the black troops:—

Order.	Black Troops. Diseases.	1864. Strength, 448. Admitted.	1864. Strength, 448. Died.	1864. Annual Ratio per 1,000. Admitted.	1864. Annual Ratio per 1,000. Died.	1859-63. Annual Ratio per 1,000. Admitted.	1859-63. Annual Ratio per 1,000. Died.
	Class I.						
1	Miasmatic Diseases ..	108	8	241·1	6·69	341·2	4·31
2	Enthetic „ ..	54	1	120·5	2·23	163·1	·54
3	Dietic „ ..	..	..	..	..	3·2	..
4	Parasitic „ ..	4	..	8·9	..	6·5	..
	Class II.						
1	Diathetic Diseases ..	20	..	44·6	..	3·8	·54
2	Tubercular „ ..	21	7	46·9	15·63	17·2	10·22
	Class III. Diseases of the—						
1	Nervous System ..	10	1	22·3	2·23	12·9	1·61
2	Circulatory „ ..	1	..	2·2	..	2·7	·54
3	Respiratory „ ..	47	3	104·9	6·69	53·8	4·84
4	Digestive „ ..	13	..	29·0	..	16·1	2·15
5	Urinary „ ..	..	..	..	..	3·8	..
6	Reproductive „ ..	7	..	15·6	..	15·6	..
7	Locomotive „ ..	2	..	4·5	..	2·2	..
8	Integumentary „ ..	49	..	109·4	..	72·7	·54
	Class IV.						
4	Diseases of Nutrition ..	..	..	..	..	1·6	..
	Class V.						
1	Accidents	27	1	60·3	2·23	57·6	..
4	Suicide	..	..	..	..	·5	·54
6	Corporal Punishment ..	2	..	4·5	..	3·8	..
	Diseases not specified ..	..	..	..	..	4·3	..
	Total	365	16	814·7	35·70	782·6	25·83

Miasmatic Diseases, though rather more prevalent than in 1863, have been much under the average. Although yellow fever was very prevalent and fatal among the civil population of Nassau no cases occurred among the black troops. Three officers, however, of the 1st West India Regiment and a gunner of the Royal Artillery died of it.

Venereal diseases also show a great reduction in their prevalence.

Diathetic Diseases caused an unusual number of admissions; seventeen of the cases under the head of *anæmia*. The Medical Officer in charge remarks that "the admissions under this head have been quite among young soldiers, and I cannot but think that the almost sole cause of their condition when admitted may be attributed to their immoral habits."

Tubercular Diseases continue the chief cause of mortality, and taken in conjunction with those of the respiratory system, have occasioned nearly two-thirds of all the deaths. The high ratio of admissions and deaths by these diseases is attributed to the great change of climate the men underwent in coming from the West Indies to the Bahamas in the end of 1863.

The great increase in the ratio of admissions by diseases of the integumentary system has been caused by the prevalence of ulcers.

The death under the class of accidents was by poisoning. The man was brought to hospital on a stretcher labouring under symptoms closely resembling those of poisoning by strychnine, and died within a few minutes after admission. Poison was not detected in the stomach after death, nor is any information given as to the grounds for suspecting it to have been the cause of death, or the circumstances under which it is supposed to have been taken.

IV. Honduras.

Honduras. The white troops employed at Honduras consisted only of the European non-commissioned officers of the detachment of the West India Regiment. They averaged about four in number and one died of consumption during the year. The black troops were a detachment of additional gunners and one of the West India Regiments; in the end of September the detachment of the 1st was replaced by one of the 2nd West India Regiment. The average strength of the black troops for the year was 260, the admissions into hospital were 177 and the deaths 5. These numbers give the ratio of 681 admissions and 19·24 deaths per 1,000 of mean strength, being almost identical with the results for 1863.

The following Table, compiled from Abstract No. XVI of Appendix and from previous reports, shows the classes of diseases by which the sickness and mortality were caused:—

Order.	Black Troops.	1864. Strength, 260.		1864. Annual Ratio per 1,000.		1859-63. Annual Ratio per 1,000.	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.						
1	Miasmatic Diseases ..	63	..	242·3	..	524·5	2·96
2	Enthetic „ ..	30	..	115·4	..	99·8	..
3	Dietic „ ..	..	..	..	..	3·0	1·77
4	Parasitic „ ..	3	..	11·6	..	9·5	..
	Class II. ..						
1	Diathetic Diseases ..	..	..	..	..	5·3	..
2	Tubercular „ ..	2	2	7·7	7·69	5·9	2·96
	Class III. Diseases of the—						
1	Nervous System ..	4	1	15·4	3·85	16·5	1·77
2	Circulatory „ ..	..	..	..	..	3·5	2 95
3	Respiratory „ ..	13	1	49·9	3·85	55·5	1·18
4	Digestive „ ..	11	1	42·3	3·85	43·1	·59
5	Urinary „ ..	1	..	3·9	..	2·4	..
6	Reproductive „ ..	2	..	7·7	..	13·6	..
7	Locomotive „ ..	..	..	..	..	3·5	..
8	Integumentary „ ..	31	..	119·2	..	174·8	·59
	Class IV.						
4	Diseases of Nutrition..	..	..	..	..	1·2	..
	Class V.						
1	Accidents	16	..	61·5	..	100·4	1·18
3	Homicide	..	..	..	..	..	·59
4	Suicide	1	..	3·9	..	..	·59
5	Execution	..	..	..	..	..	·59
6	Corporal Punishment..	..	..	..	..	7·1	..
	Diseases not specified..	..	..	..	..	1·8	·59
	Total ..	177	5	680·8	19·24	1071·4	18·31

The admissions have been greatly under the average of the five preceding years, the difference being chiefly in miasmatic diseases and those of the integumentary system and in accidents. The mortality differs little from the average, but there has been a marked reduction in that from miasmatic and an increase from tubercular diseases.

There was nothing connected with the prevalence of any of the classes of diseases which seems to require special remark.

Section II.

On the Extent of Invaliding.

West Indies.

During the year there were 20 of the white troops sent to England as invalids from the Windward and Leeward Command, and the same number from Jamaica, being in the ratio of 18·3 and 29·4 per 1,000 of the strength.

The diseases for which these men were invalided are stated in Abstract No. XVII of Appendix, and are classified in the following Table :—

White Troops	Windward and Leeward Command. Mean Strength, 1,090.	Jamaica. Mean Strength, 677.
Classes of Diseases.	Invalids sent Home in 1864.	Invalids sent Home in 1864.
Paroxysmal Fevers	2	1
Dysentery and Diarrhœa	1	..
Ophthalmia	5	1
Rheumatism	..	2
Venereal Diseases	2	..
Tubercular „	2	6
Diseases of the—		
Nervous System	1	2
Circulatory „	5	1
Respiratory „	..	1
Digestive „	2	1
Urinary „	..	1
Locomotive „	..	1
Diseases of Nutrition	..	1
Accidents and Violence	..	2
Total	20	20
Ratio per 1,000 of Strength 1864	18·3	29·4
Ratio per 1,000 of Strength 1861–63	35·5	15·1

This shows a marked reduction in the proportion of invalids sent home from the Windward and Leeward Command and increase in that from Jamaica. The former has been almost entirely in the cases of ophthalmia, the latter has been in a great measure due to tubercular diseases.

The numbers of invalids of the white troops who were discharged the service at Netley, and of the black troops who were discharged in the West Indies, with the causes of disability, are shown in the following Table framed from Abstract No. XVII of Appendix. The strength and discharges of the black troops in Western Africa are, for reasons explained in former Reports, necessarily included with those of the West Indies.

West Indies.

Stations	White Troops. Windward and Leeward Command.	White Troops. Jamaica.	Black Troops. West Indies and Western Africa.
Strength	1,090	677	3,639
Diseases.	Discharged as Invalids.	Discharged as Invalids.	Discharged as Invalids.
Dysentery and Diarrhœa	..	1	1
Ophthalmia	2	..	1
Rheumatism	1	1	30
Venereal Diseases	..	1	2
Diathetic „	..	..	2
Tubercular „	3	4	12
Diseases of the—			
Nervous System	..	..	8
Circulatory „	6	..	..
Respiratory „	..	..	4
Digestive „	1	1	8
Reproductive „	..	..	2
Locomotive „	..	..	2
Integumentary „	1	..	5
Diseases of Nutrition	..	1	4
Accidents and Violence	2	..	14
Total	16	9	95
Ratio per 1,000 of Mean Strength 1864	14·7	13·3	26·1
Ratio per 1,000 of Mean Strength 1860–63	15·4	12·8	18·8

The proportion discharged of the white troops closely approximates the average of the four preceding years; that of the black, as might have been anticipated, is considerably above the average. The chief causes of disability among the latter have been rheumatism, accidents, &c., and tubercular diseases, all of which have been probably increased by the exposure and privations of the men engaged in the Ashantee campaign.

Section III.

Mean Daily Sick.

The average number constantly of the white troops in Jamaica was 29, and in the Windward and Leeward Command 66; and of the black troops in Jamaica 41, Windward and Leeward Command 42, Bahamas 21, and Honduras 10. From these numbers the following results are deduced:—

West Indies.

		White Troops.		Black Troops.			
		Windward and Leeward Command.	Jamaica.	Windward and Leeward Command.	Jamaica.	Bahamas.	Honduras.
Ratio per 1,000 constantly Sick.	1864 ..	60·55	42·84	62·04	66·56	46·87	38·46
	1859–63 ..	39·60	34·94	37·92	55·36	41·17	33·55
		days.	days.	days.	days.	days.	days.
Mean Sick Time to each Soldier.	1864 ..	22·10	15·64	22·65	24·29	17·11	14·04
	1859–63 ..	14·46	12·75	10·99	20·20	15·03	12·55
Average Duration of the Cases.	1864 ..	14·65	14·02	24·14	16·76	21·00	20·62
	1859–63 ..	13·25	14·06	12·26	17·75	19·20	10·90

There has been a very great increase in the mean daily sick in the Windward and Leeward Command, and in the mean sick time to each soldier. This has arisen chiefly from the epidemic of fever among the troops, which has been already noticed; there has also been an increase, though less marked, in Jamaica, probably the result of the excess in the prevalence of venereal. The increase in the duration of cases in Honduras, which was noticed in the Report for 1863, has been more marked in the year now under review. This would lead to the inference that the reduction in the admissions into hospital during the year was chiefly in trifling ailments requiring only a day or two for treatment.

Section IV.

Influence of Age on the Mortality.

West Indies.

In consequence of the changes of the regiments which took place in the West Indies in the course of the year the usual information on this head is not available for the white troops.

For a similar reason—the numerous changes of stations—the information respecting the mortality of the black troops at different ages is more limited than usual. The following Table shows the numbers serving and the deaths at each quinquennial period of life so far as the data are available:—

Black Troops in West Indies.		Under 20 Years.	20–24	25–29	30–34	35–39	40 and upwards.
Additional Gunners Royal Artillery.	Strength	..	24	20	7	4	..
	Deaths	..	1	1	1	..	..
2nd West India Regiment	Strength	112	238	182	41	4	..
	Deaths	..	2	3	..	3	..
Corps of Military Labourers.	Strength	28	79	46	25	24	12
	Deaths	..	3	..	1	1	..
Total ..	Strength	140	341	248	73	32	12
	Deaths	..	6	4	2	4	..
Ratio of Deaths per 1,000 of Strength.	1864 ..	..	17·60	16·13	27·40	12·50	..
	1859-63.	15·69	22·99	20·32	22·79	17·68	26·32

West Indies. Taking the average of the whole period these results show that there is no marked increase of mortality among the black troops with the advance of age, but the numbers are scarcely sufficient as yet to justify any very positive deductions.

V.—ON THE HEALTH OF THE TROOPS SERVING IN WESTERN AFRICA.

Western Africa. At the beginning of the year the troops employed in Western Africa consisted of the 3rd West India Regiment at Sierra Leone and the Gambia, and a detachment of the 2nd, and the right wing of the 4th West India Regiment on the Gold Coast. In the beginning of April the left wing of the 4th and two companies of the 1st West India Regiment arrived at Cape Coast Castle to re-inforce the troops employed on field service against the Ashantees; and in August a detachment of the 5th West India Regiment arrived at Lagos to relieve a detachment of the 3rd stationed there. About the middle of August, on the cessation of hostilities, the detachments of the 1st and 2nd West India Regiments embarked for the West Indies.

The average strength of European non-commissioned officers was about 26, and of these 3 died, the fatal diseases being remittent fever, delirium tremens, and chronic inflammation of the liver.

The average strength of the black troops at each of the subordinate commands, and the admissions into hospital and deaths were as follows:—

	Average Strength.	Admissions into Hospital.	Deaths	Ratio per 1,000 of Strength.		1859–63. Ratio per 1,000.	
				Admitted	Died.	Admitted	Died.
Sierra Leone ..	444	473	12	1,065	27·01	830	28·62
The Gambia ..	267	407	7	1,524	26·24	1,089	32·84
Lagos	170	317	6	1,865	35·28	2,438	64·04
The Gold Coast ..	757	1,877	71	2,479	93·79	784	31·89

At Sierra Leone and the Gambia the sickness has been above and the mortality under the average; at Lagos both have been much below the average of the two years during which that station has been occupied; while on the Gold Coast the sickness and mortality caused by the influence of climate and the other unfavourable conditions under which the troops were placed during the campaign against the Ashantees, amounted to nearly three times the average of the five preceding years.

The following Table, framed from Abstract No. XVIII of Appendix, shows the admissions and deaths by each of the principal classes of diseases:—

Orders.	Diseases.	Sierra Leone. Strength 444. Admitted.	Died.	1864. Annual Ratio per 1,000. Admitted.	Died.	1859–63. Annual Ratio per 1,000. Admitted.	Died.	Gambia. Strength 267. Admitted.	Died.	1864. Annual Ratio per 1,000. Admitted.	Died.	1859–63. Annual Ratio per 1,000. Admitted.	Died.	Gold Coast and Lagos. Strength 927. Admitted.	Died.	1864. Annual Ratio per 1,000. Admitted.	Died.	1859–63. Annual Ratio per 1,000. Admitted.	Died.
	Class I.																		
1	Miasmatic Diseases	114	2	256·7	4·50	262·4	5·40	160	1	599·3	3·75	531·2	5·15	1,346	49	1452·0	52·86	330·8	19·91
2	Enthetic „	145	..	326·6	..	161·5	..	98	..	367·0	..	167·4	1·94	211	..	227·6	..	141·4	..
3	Dietic „	..	..	..	..	2·2	·54	2	..	7·5	..	2·5	..	6	1	6·5	1·08	4·1	..
4	Parasitic „	14	..	31·5	..	31·9	..	..	..	..	..	12·9	..	87	..	93·9	..	141·4	..
	Class II.																		
1	Diathetic Diseases	2	..	4·5	..	4·3	..	3	..	11·2	..	11·6	1·94	28	3	30·2	3·24	1·5	..
2	Tubercular „	5	2	11·3	4·50	16·7	8·10	2	..	7·5	..	12·9	7·73	10	4	10·8	4·31	4·6	2·55
	Class III. Diseases of the—																		
1	Nervous System	5	..	11·3	..	17·3	3·24	3	..	11·2	..	14·2	1·29	26	2	28·0	2·16	15·8	3·06
2	Circulatory „	..	..	..	..	1·1	..	..	..	..	..	2·5	1·29	4	2	4·3	2·16	1·0	·51
3	Respiratory „	34	3	76·6	6·76	66·4	4·32	39	3	146·1	11·24	94·0	7·73	141	10	152·1	10·78	29·1	2·55
4	Digestive „	15	1	33·8	2·25	27·0	4·86	8	1	30·0	3·75	39·3	2·57	43	3	46·4	3·24	38·3	1·53
5	Urinary „	2	1	4·5	2·25	2·7	..	7	..	26·2	..	3·9	·64	3	..	3·2	..	4·1	..
6	Reproductive „	18	..	40·5	..	9·2	..	15	..	56·2	..	5·1	..	11	..	11·9	..	10·2	..
7	Locomotive „	6	..	13·5	..	13·5	·54	2	..	7·5	..	9·6	·64	4	..	4·3	..	8·7	..
8	Integumentary „	89	..	200·5	..	132·8	..	49	..	183·5	..	97·9	..	196	..	211·4	..	141·9	..
	Class IV.																		
4	Diseases of Nutrition	1	1	2·3	2·25	·5	..	2	..	7·5	..	1·3	..	2	..	2·2	..	..	..
	Class V.																		
1	Accidents	20	1	45·0	2·25	51·8	..	16	..	59·9	..	67·0	..	72	1	77·7	1·05	62·8	3·06
2	Battle	..	..	..	..	20·0	1·62	..	..	..	..	7·1	..	..	..	..	..	8·7	·51
3	Homicide	..	..	..	..	..	..	..	..	..	..	·6	·64	..	1	..	1·08	..	..
4	Suicide	1	1	2·3	2·25	..	..	1	1	3·7	3·75	..	·64	..	..	..	..	..	·51
5	Execution	..	..	..	..	..	..	..	..	..	..	..	·64	..	1	..	1·08	..	1·02
6	Corporal Punishment	2	..	4·5	..	7·0	..	..	..	..	..	3·9	..	4	..	4·3	..	9·7	..
	Diseases not specified	..	..	..	..	1·6	..	..	1	..	3·75	3·9	..	..	..	..	..	1·5	..
	Total	473	12	1065·4	27·01	829·9	28·62	407	7	1524·3	26·24	1088·8	32·84	2,194	77	2366·8	83·07	955·6	35·21

Western Africa.

The increase in the admissions at Sierra Leone has been chiefly in venereal diseases and those of the reproductive and integumentary systems; at the Gambia, in the same classes, and also in miasmatic diseases and those of the respiratory system; and on the Gold Coast there has been a considerable increase in almost all the classes, but most marked in the same as at the Gambia.

MIASMATIC DISEASES have been more prevalent than formerly at the Gambia and on the Gold Coast. When subdivided they give the following results:—

Diseases.	Sierra Leone.			The Gambia.			The Gold Coast and Lagos.		
	Admitted in 1864.	Ratio per 1,000 Admitted.		Admitted in 1864.	Ratio per 1,000 Admitted.		Admitted in 1864.	Ratio per 1,000 Admitted.	
		1864.	1859–1863.		1864.	1859–1863.		1864.	1859–1863.
Eruptive Fevers	1	2·3	18·4	..	..	41·2	2	2·2	5·1
Paroxysmal „	58	130·6	127·9	89	333·3	329·7	789	851·1	115·3
Continued „	1	2·3	2·2	..	..	7·1	1	1·1	1·5
Dysentery and Diarrhœa ..	20	45·0	24·8	36	134·8	91·6	428	461·7	135·3
Sorethroat and Influenza ..	2	4·5	5·9	5	18·7	8·4	11	11·9	4·6
Ophthalmia	3	6·8	14·6	6	22·5	16·1	23	24·8	16·8
Rheumatism	28	63·1	57·2	24	89·9	32·8	79	85·2	49·5

As regards Sierra Leone and the Gambia the most striking points in this Table are the almost complete immunity from eruptive fevers, and the marked increase in dysentery and diarrhœa, and at the Gambia, also in rheumatism.

The great prevalence of dysentery and diarrhœa at Sierra Leone is stated to have been due to the arrival in August from Lagos of two companies of the 3rd West India Regiment, bringing with them a number of men suffering from these diseases contracted on field service in the Ashantee campaign. At the Gambia the ratio, though very high, is considerably under that of 1863.

On the Gold Coast and at Lagos there has been an enormous increase in the admissions by paroxysmal fever and by dysentery and diarrhœa. This was the result of the expedition against the Ashantees. As a detailed account of this by Assistant-Surgeon Gardiner was published in the last volume of Reports (Vol. V., p. 323), it may be sufficient to state that in the end of 1863 a company of the 4th West India Regiment was sent to Mansue, about 40 miles from Cape Coast Castle, where a depôt for military stores was formed, and in the end of January all the available troops at Cape Coast Castle were marched up the country, passing through Mansue and taking with them the men and stores to Prahsue, a native village on the right bank of the river Prah, about 45 miles from Mansue. A camp was formed there and the troops were set to work at once to clear the bush, hut themselves, and build Commissariat and Military Store houses and hospitals. Before these works were completed the rains set in, and the men's huts were then found to be incapable of keeping out the rain. The site of the camp is described as in a vast forest, close to and on the bank of a river, and surrounded on all sides by dense jungle growth. When the rains set in the whole camp became a vast swamp, and fever, dysentery, and diarrhœa attacked the men. The days were excessively hot, the nights damp and chilly; the food of the men was indifferent, consisting chiefly of salt pork, salt beef, biscuit, and rice, and the water very bad. In the latter end of April the men at Prahsue and Swadroo were relieved by detachments of the troops which had arrived from the West Indies, but these soon succumbed to the same causes of disease as those who preceded them, so that by the beginning of June half the force at Prahsue was on the sick list. Towards the end of June the expedition was abandoned, the troops were moved to Cape Coast Castle, and in August the detachments of the 1st and 2nd West India Regiments were embarked for the West Indies.

The influence of the field service upon the troops is shown strongly in the admissions and deaths by dysentery. Of 210 cases of this disease 163 occurred in the four months April–July, and of 32 deaths 26 were in the same period. Diarrhœa also became very prevalent in May, and it continued to cause a considerable number of admissions into hospital for some months after the return of the troops to Cape Coast Castle. It may be observed that all this mortality by disease occurred in a campaign in which not a single death by the hand of the enemy has been recorded. *Western Africa.*

Enthetic Diseases.—The great prevalence of this class is attributed, as in the previous year, to the troops who arrived from the West Indies.

Parasitic Diseases.—Guinea worm, which had almost disappeared from the Returns in 1863, has again given rise to a large number of admissions. Among the troops on the Gold Coast and at Lagos there were 63 admissions, and at Sierra Leone 9. It is probable that in the latter the disease was contracted on service in the Ashantee campaign.

Diseases of the Integumentary System.—The great increase in the admissions by this class of diseases has been chiefly due to the prevalence of ulcers, and particularly among the troops employed on field service.

Violence.—Among the deaths by violence are one suicide at Sierra Leone and one at the Gambia, one death by poisoning at Lagos, but it is not stated under what circumstances, one murder on the Gold Coast by stabbing, and one execution for that crime.

The extent of invaliding and the disabilities by which it was caused have been already stated with those of the black troops serving in the West Indies.

Section III.

Mean Daily Sick.

The average number constantly non-effective from sickness during the year was at Sierra Leone 19·24, at the Gambia 15·66, and on the Gold Coast and at Lagos 72·54. The following are the results obtained from these numbers :—

		Sierra Leone.	The Gambia.	The Gold Coast and Lagos.
Ratio per 1,000 constantly Sick ..	1864 ..	43·33	58·65	78·25
	1861–63..	41·18	41·62	44·95
		Days.	Days.	Days.
Average Sick Time to each soldier ..	1864 ..	15·82	21·41	28·56
	1861–63..	15·03	15·19	17·58
Average Duration of Cases of Sickness	1864	14·85	14·04	11·19
	1861–63..	15·11	11·86	16·24

This Table shows an increase in the mean daily sick at all the stations, but to much the greatest extent on the Gold Coast. At Sierra Leone and the Gambia it was probably due, in a great measure, to the sickness among the men sent to these stations when the field force on the Gold Coast was broken up. The average sick time to each soldier has also been greater than formerly, but the duration of the cases, except at the Gambia, has been shorter, a result probably of the increase in the amount of sickness having been caused by fever and acute diseases.

VI.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF ST. HELENA.

St. Helena. The Garrison consisted during the year of Royal Artillery, Royal Engineers, and the St. Helena Regiment. From the 20th of February to the 19th of April a detachment of the 5th West India Regiment was quartered at James Town. As there were only 6 admissions into hospital and no deaths it seems unnecessary to give any details respecting it.

The average strength of the white troops was 531, the admissions into hospital were 346, and the deaths 4, being in the proportion of 652 and 7·53 per 1,000 of the strength, and considerably under the average.

There were no deaths among the invalids sent to England.

The following Table shows the admissions and deaths by the various classes of diseases. The details are given in Abstract No. XIX of Appendix.

Order.	Diseases.	Strength, 531.				Ratio per 1,000 of Strength.			
			Died.			1864.		1859–63.	
		Admitted.	At St. Helena.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	96	1	..	1	180·8	1·88	345·1	2·74
2	Enthetic „ ..	51	..	..	..	96·0	..	93·3	..
3	Dietic „ ..	16	..	..	..	30·1	..	41·7	·34
4	Parasitic „ ..	4	..	..	..	7·5	..	2·7	..
	Class II.								
1	Diathetic Diseases ..	2	..	..	..	3·8	..	5·5	·34
2	Tubercular „	4	..	..	..	7·5	..	5·1	1·71
	Class III. Diseases of the—								
1	Nervous System ..	11	..	..	..	20·7	..	26·6	2·05
2	Circulatory „ ..	7	..	..	..	13·2	..	7·5	·34
3	Respiratory „ ..	11	2	..	2	20·7	3·77	47·1	·68
4	Digestive „ ..	33	..	..	..	62·2	..	57·4	·68
5	Urinary „ ..	5	..	..	..	9·4	..	3·8	..
6	Reproductive „ ..	4	..	..	..	7·5	..	3·4	..
7	Locomotive „ ..	..	..	..	..	..	..	2·0	..
8	Integumentary „ ..	19	..	..	..	35·8	..	71·4	..
	Class V.								
1	Accidents	80	1	..	1	150·7	1·88	149·7	1·71
6	Corporal Punishment ..	1	..	..	..	1·9	..	1·4	..
	Diseases not specified ..	..	..	..	..	..	..	4·1	..
	No appreciable disease ..	2	..	..	..	3·8	..	..	..
	Total	346	4	..	4	651·6	7·53	867·8	10·59

This shows a very great reduction in the admissions by miasmatic diseases and a considerable one also in those by diseases of the respiratory and integumentary systems.

MIASMATIC DISEASES when subdivided give the following results:—

Diseases.	Admitted	Died.	Ratio per 1,000 of Mean Strength			
			1864.		1859–63.	
			Admitted	Died.	Admitted	Died.
Eruptive Fevers	..	..	..	..	..	..
Paroxysmal „	..	..	..	..	28·7	·35
Continued „	26	1	49·0	1·88	106·2	1·02
Dysentery and Diarrhœa ..	26	..	49·0	..	98·0	1·02
Sorethroat and Influenza ..	5	..	9·4	..	21·9	..
Ophthalmia	18	..	33·9	..	25·9	..
Rheumatism	13	..	24·5	..	29·0	..

It will be seen from this Table that the reduction has been in all the groups of diseases except ophthalmia, which shows a slight increase. The decrease, which has been progressive since 1860, is probably due to the improved sanitary arrangements; the increase in ophthalmia is stated to have occurred in August and September in a detachment of the St. Helena Regiment employed on the public works at an outpost. The men were removed to town and were isolated from the rest of the corps till the disease ceased.

During the year 24 invalids were sent to England, being in the ratio of 45·2 per 1,000 of the strength and 6 were finally discharged the service at Netley. The disabilities of the men invalided and discharged are stated in Abstract No. XX of Appendix, of which the following is a classified summary:—

Diseases.	Invalids Sent Home from St. Helena.	Discharged the Service at Invalid Depôt.
Diarrhœa	1	..
Ophthalmia	2	1
Chronic Rheumatism	1	..
Tubercular	3	2
Diseases of the—		
Nervous System	7	..
Circulatory	1	..
Respiratory	2	..
Digestive	3	2
Urinary	2	..
Integumentary	1	..
Accidents	1	1
Total	24	6
Ratio per 1,000 of Mean Strength { 1864 ..	45·2	11·3
Ratio per 1,000 of Mean Strength { 1860-63 ..	15·8	4·9

The number of invalids sent home has been greatly in excess of the average, but this may possibly have been in some measure due to the proposed disbandment of the St. Helena Regiment. The proportion sent home on account of diseases of the nervous system was unusually great, and, with one exception, were cases of mental disease. No explanation of the circumstance is given in the report of the Medical Officer.

The mean daily sick during the year was 19; the ratio per 1,000 of strength therefore was 35·8, the average sick time to each soldier was 13·1 days, and the average duration of the cases 20 days. These results vary but little from the average, except as regards the duration of the cases, which was more than five days in excess of previous years; this increase would therefore lead to the inference that the reduction in the

St. Helena. admissions had taken place chiefly in trifling cases of illness which required but a very short time for their treatment.

The following Table shows the influence of age on the mortality of the troops serving in this island:—

		Under 20.		20–24.		25–29.		30–34.		35–39.		40 and upwards.	
		Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.	Strength on 1st Jan.	Died during Year.
Troops		12	..	283	1	190	2	70	1	12	..	1	..
Ratio of Deaths per 1,000 of Strength ..	1864.	..		3·53		10·53		14·28		..		..	
	1861-3	..		5·29		8·99		23·19		14·08		..	

VII.—ON THE HEALTH OF THE TROOPS SERVING AT THE CAPE OF GOOD HOPE.

Section I.

Sickness and Mortality.

Cape of Good Hope. In the middle of November the 1st Battalion 10th Regiment arrived from Ireland, and in the end of December the 2nd Battalion of the same regiment sailed from the Cape for India, with these exceptions there were no changes in the Force employed.

The average strength of the troops during the year was 4,123; the admissions into hospital were 3,698 and the deaths 36, of which one occurred among the invalids sent to England. These numbers give the proportion of 897 admissions and 8·71 deaths per 1,000 of mean strength.

The following Table shows the amount of sickness and mortality in each of the corps employed in this Command:—

	Average Annual Strength.	Admissions into Hospital.	Deaths.				Annual Ratio per 1,000 of Mean Strength.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted	Died.
Royal Artillery	138	120	..	..	..	..	869	..
Royal Engineers ..	175	85	..	..	..	..	486	..
2nd Bat. 5th Regiment.	768	609	3	1	..	4	793	5·21
1st Bat. 10th ,,	66	106	..	..	..	..	1,606	..
2nd Bat. 10th ,,	756	464	8	2	..	10	614	13·25
,, 11th	780	918	7	2	1	10	1,215	12·82
96th Regiment	760	504	3	2	..	5	663	6·58
Cape Mounted Rifles ..	668	739	6	..	..	6	1,106	8·98

The other death was that of a serjeant of the Army Hospital Corps.

The high ratio of admissions in the 2nd Battalion 11th Regiment was mainly due to the prevalence of venereal diseases in it while stationed at

Cape Town during the first five months of the year, and to the same cause is to be ascribed the excess in the 1st Battalion 10th Regiment during the short time it was in the Command. *Cape of Good Hope.*

The influence of the various classes of diseases in producing sickness and mortality are shown in the following Table. The details for 1864 are given in Abstract No. XIX of Appendix.

Order.	Diseases.	1864. Mean Strength, 4,123. Admitted.	Deaths. At Cape.	Deaths. Of Invalids.	Deaths. Total.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	1859-63. Ratio per 1,000 of Mean Strength. Admitted.	1859-63. Ratio per 1,000 of Mean Strength. Died.
	Class I.								
1	Miasmatic Diseases ..	846	5	..	5	205·2	1·21	275·0	2·34
2	Enthetic „ ..	1,260	..	..	..	305·3	..	197·9	·05
3	Dietic „ ..	75	2	..	2	18·2	·48	12·6	·47
4	Parasitic „ ..	27	..	..	..	6·5	..	12·6	..
	Class II.								
1	Diathetic Diseases ..	16	..	..	..	3·9	..	3·3	·09
2	Tubercular „ ..	41	6	..	6	9·9	1·45	8·5	1·36
	Class III. Diseases of the—								
1	Nervous System ..	100	3	..	3	24·3	·73	24·1	1·27
2	Circulatory „ ..	61	10	1	11	14·8	2·67	20·1	1·69
3	Respiratory „ ..	111	2	..	2	26·9	·48	51·6	·94
4	Digestive „ ..	208	2	..	2	50·5	·48	44·7	·80
5	Urinary „ ..	7	..	..	..	1·7	..	2·0	·14
6	Reproductive „ ..	44	..	..	..	10·9	..	9·4	..
7	Locomotive „ ..	10	..	..	..	2·4	..	5·0	..
8	Integumentary „ ..	501	..	..	..	121·5	..	101·8	..
	Class IV.								
4	Diseases of Nutrition ..	4	..	..	..	1·0	..	·7	..
	Class V.								
1	Accidents	371	5	..	5	90·7	1·21	85·9	1·45
3	Homicide	..	..	..	..	..	..	..	·09
4	Suicide	..	..	..	..	..	..	·1	·19
5	Execution	..	..	..	..	..	..	..	·05
6	Corporal Punishment ..	11	..	..	..	2·7	..	3·8	..
	Diseases not specified ..	2	..	..	..	·5	..	7·6	..
	Total	3,698	35	1	36	896·9	8·71	866·7	10·93

This Table shows a great increase in the amount of venereal, which, however, has been nearly counterbalanced by a reduction in miasmatic diseases. The total shows a slight increase in the admissions and a decrease in the deaths compared with the average of the five preceding years.

MIASMATIC DISEASES when subdivided into groups give the following results :—

Cape of Good Hope.

Diseases.	Admitted	Died.	Annual Ratio per 1,000 of Strength.			
			1864.		1859–63.	
			Admitted	Died.	Admitted	Died.
Eruptive Fevers	3	..	·7	..	1·7	·05
Paroxysmal „	4	..	1·0	..	7·7	·05
Continued „	119	2	28·9	·48	46·1	1·27
Dysentery, Diarrhœa, and Cholera	111	3	26·9	·73	44·7	·98
Sorethroat and Influenza ..	110	..	26·7	..	21·8	..
Ophthalmia	323	..	78·3	..	90·8	..
Rheumatism	124	..	30·1	..	39·0	..

There has been a decrease in the prevalence of all these groups of diseases except sorethroat and influenza, which have been slightly above the average. Ophthalmia, though less prevalent than in the preceding year, is still a source of considerable inefficiency; it is, however, chiefly in the Cape Mounted Rifles that the excess has occurred, 149, or nearly one-half, of the admissions have been in that corps.

Enthetic Diseases.—The proportion of admissions by venereal diseases was considerably above that in 1863 and greatly in excess of the average of the five preceding years. They were most prevalent in the 11th Regiment at Cape Town during the first five months of the year, and in the 1st Battalion 10th Regiment during the six weeks it was quartered there at the end of the year. In the 2nd Battalion 10th also, the admissions were very high after their arrival at Cape Town from King William's Town in the end of June, nearly three-fourths of the cases in it having occurred in the last half of the year. The great excess of venereal diseases seems therefore to have been contracted at Cape Town; in King William's Town, however, there appears to have been a considerable increase during the latter half of the year.

Dietic Diseases.—It is satisfactory to observe that no cases of scurvy are reported, which in 1862 gave rise to 22 admissions.

Diseases of the Circulatory System although furnishing a smaller proportion of cases than formerly have been the cause of nearly one-third of the deaths which occurred during the year. Of 11 deaths by this class six were the results of aneurism, three of valvular disease of the heart, one of rupture of the vena cava, and one of inflammation of the pericardium.

The other classes of diseases do not seem to require special comment.

Section II.

On the Extent of Invaliding.

During the year 151 men were sent to England as invalids, being in the ratio of 36·6 per 1,000 of the strength. Twenty-five invalids were discharged the service at the Cape with a view to remain there, and 85 at Netley, making a total of 110, or 26·7, per 1,000 of the strength. The disabilities of the invalids are classified in the following Table from Abstract No. XX of Appendix:—

Cape of Good Hope.

Disabilities of	Invalids sent to England.	Invalids Discharged the Service.	
		At the Cape.	At Netley.
Paroxysmal Fevers	..	..	1
Dysentery and Diarrhœa	1	..	1
Ophthalmia..	39	..	24
Rheumatism	12	10	6
Venereal Diseases	11	1	2
Diathetic „	..	..	1
Tubercular „	15	3	5
Diseases of the—			
Nervous System	20	..	10
Circulatory „	15	6	12
Respiratory „	3	1	2
Digestive „	8	3	4
Urinary „	1	..	..
Reproductive „	1	..	..
Locomotive „	3	..	6
Integumentary „	3	..	2
Diseases of Nutrition	10	1	9
Accidents and Violence	4	..	..
Worn out	3	..	..
Diseases not specified	2	..	..
Total	151	25	85
Ratio per 1,000 of Mean Strength .. .. 1864 ..	36·6	6·1	20·6
Ratio per 1,000 of Mean Strength 1861-3	24·0	1·0	18·2

The invaliding was greatly above the average, but this is stated by the Principal Medical Officer to have arisen from the discharge of a number of men from the Cape Mounted Rifles on account of a proposed reduction of that corps; the 25 invalids discharged in the colony were all from it, and 45 of those sent to England, including 10 of the venereal cases. The principal causes of invaliding still continue to be ophthalmia and diseases of the circulatory system.

Section III.

Mean Daily Sick.

The average number constantly non-effective from sickness during the year amounted to 211. The following Table gives the usual information on this head:—

	1864.	1860-63.
Ratio per 1,000 of Strength constantly Sick	51·18	45·99
	Days.	Days.
Average Sick time to each Soldier	18·68	16·79
Average duration of cases of Sickness	20·83	19·62

There has thus been an increase in the mean daily sick to the extent of 5 per 1,000, and an increase also in the average sick time to each soldier, and in the duration of the cases.

Section IV.

On the Influence of Age on the Mortality.

Cape of Good Hope. The numbers serving and the deaths at each age, in quinquennial periods, are stated in Abstract No. XXI of Appendix, from which the following Table has been framed :—

		Under 20	20–24	25–29	30–34	35–39	40 and upwards.
Ratio of Deaths per 1,000 living	1864 ..	..	3·55	11·34	16·19	20·73	80·15
	1859–63	4·95	9·16	9·78	13·69	17·07	31·88

These results show a considerably more rapid increase with the advance of age than takes place among the civil population of England.

VIII.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF MAURITIUS.

Section I.

Sickness and Mortality.

Mauritius. The only change which took place in the Force employed was the arrival on the 3rd of December of the Head Quarters 2nd Brigade Royal Artillery and the 2nd Company Royal Engineers.

The average strength of the troops during the year was 1,789; the admissions into hospital among them amounted to 1,290, and the deaths to 21, of which three occurred among the invalids sent to England. These numbers show the admissions to have been in the ratio of 721, and the deaths of 11·74 per 1,000 of the strength, the former being a little above and the latter below the proportion in 1863.

The sickness and mortality in each of the corps in the Island were as follows :—

	Average Annual Strength.	Admissions into Hospital.	Deaths.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	233	175	4	2	1	7	751	30·04
Royal Engineers ..	156	123	..	..	..	..	788	..
2nd Batt., 13th Regiment	662	404	6	..	2	8	610	12·08
„ 2 4th „ ..	748	585	6	..	..	6	782	8·02

The mortality in the Royal Artillery has been high, but this is evidently an irregularity arising from the small numbers under observation.

The following Table shows the influence of the different classes of diseases in producing the sickness and mortality. The details for 1864 will be found in Abstract No. XIX of Appendix.

Mauritius.

Order.	Diseases.	Strength 1,789.				1864.		1859–63.	
		Admitted.	Deaths.			Ratio per 1,000.		Ratio per 1,000.	
			At Mauritius.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	359	4	..	4	200·7	2·23	324·8	14·42
2	Enthetic „ ..	343	..	..	..	191·7	..	92·5	..
3	Dietic „ ..	25	..	..	..	14·0	..	15·8	·22
4	Parasitic „ ..	9	..	..	..	5·0	..	8·6	..
	Class II.								
1	Diathetic Diseases ..	5	..	..	..	2·8	..	3·2	..
2	Tubercular „ ..	18	4	2	6	10·1	3·35	11·9	1·98
	Class III.								
	Diseases of the—								
1	Nervous System ..	34	2	..	2	19·0	1·12	22·4	1·10
2	Circulatory „ ..	21	2	..	2	11·7	1·12	11·0	·55
3	Respiratory „ ..	65	2	..	2	36·3	1·12	56·2	·66
4	Digestive „ ..	117	2	1	3	65·4	1·68	77·7	1·10
5	Urinary „ ..	5	1	..	1	2·8	·56	2·8	..
6	Reproductive „ ..	27	..	..	..	15·1	..	12·4	..
7	Locomotive „ ..	10	..	..	..	5·6	..	5·5	..
8	Integumentary „ ..	134	..	..	..	74·9	..	121·9	·11
	Class IV.								
4	Diseases of Nutrition	18	..	..	..	10·1	..	8·9	·11
	Class V.								
1	Accidents	97	1	..	1	54·2	·56	71·0	1·10
4	Suicide	..	..	..	..	..	..	·4	1·10
6	Corporal Punishment	3	..	..	..	1·7	..	3·4	..
	No appreciable disease	..	..	..	..	..	..	·6	..
	Diseases not specified	..	..	..	..	..	..	6·2	..
	Total ..	1,290	18	3	21	721·1	11·74	857·2	22·45

The admissions have been considerably under and the deaths only one-half the average of the five preceding years; the difference in the latter has been in miasmatic diseases, in the former it has been in the same class and in diseases of the integumentary system, but there has been a considerable increase in venereal diseases.

Miasmatic Diseases when subdivided give the following results :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength.			
			1864.		1859–63.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	..	..	..	..	·4	..
Paroxysmal „	3	..	1·7	..	17·4	·55
Continued „	64	1	35·8	·56	63·4	1·98
Dysentery, Diarrhœa, and Cholera	136	3	76·0	1·68	158·2	3·85
Spasmodic Cholera ..	..	..	..	..	19·6	7·48
Sorethroat and Influenza ..	19	..	10·6	..	9·1	..
Ophthalmia..	52	..	29·1	..	26·6	..
Rheumatism	64	..	35·8	..	23·7	..

This shows a marked decrease in all the groups of diseases except sorethroat and influenza, ophthalmia, and rheumatism, the two former of which have very

Mauritius. slightly exceeded the average. The absence of spasmodic cholera and the reduction in the amount of dysentery have been the chief causes of the lower rate of mortality; continued fevers also have been less fatal.

Ophthalmia was above the average of the previous years; two-thirds of the cases were in the 2nd Battalion 13th Regiment, which had suffered greatly from this disease at the Cape of Good Hope, and also in 1863 at the Mauritius. Eighty-four men of the corps were sent to England for change of climate on account of it, and the surgeon reports that it has now ceased to prevail in the regiment.

ENTHETIC DISEASES.—The admissions from venereal diseases continued to increase in the Island. The 24th Regiment furnished much the highest proportion of these cases, more than half the admissions having occurred in it. No special reason has been assigned for the increase.

The reduction in the prevalence of DISEASES OF THE INTEGUMENTARY SYSTEM, which was noticed in last Report, continues to be progressive.

The other classes do not require special notice.

Section II.

On the Extent of Invaliding.

There were 140 invalids sent to England during the year, being in the ratio of 78·25 per 1,000 of the strength. This was very much in excess of the average, but appears to have been the result of a desire to eradicate ophthalmia, which had been a source of great inefficiency in the 13th Regiment. 102 of the invalids were from that corps, and of these 84 were affected with ophthalmia.

The diseases of the invalids sent home, and of those finally discharged the service at Netley, are shown in the following Table, framed from Abstract No. XX of Appendix:—

Disabilities.	Invalids sent Home.	Discharged the Service at Netley.
Dysentery and Diarrhœa	3	1
Ophthalmia	84	17
Rheumatism	4	1
Venereal Diseases	2	1
Dietic „	1	..
Diathetic „	..	4
Tubercular „	17	9
Diseases of the—		
Nervous System	3	1
Circulatory „	9	8
Respiratory „	1	..
Digestive „	4	3
Urinary „	3	3
Reproductive „	1	..
Locomotive „	2	3
Diseases of Nutrition..	5	2
Accidents and Violence	1	..
Total	140	53
Ratio per 1,000 of Mean Strength .. .. 1864 ..	78·25	29·62
Ratio per 1,000 of Mean Strength .. .. 1861-63 ..	26·18	11·77

The numbers sent home and discharged the service have both been greatly above the average; the disabilities in which the increase has chiefly occurred·

being ophthalmia, consumption, and diseases of the circulatory system. The former, as already stated, was confined chiefly to the 13th Regiment and was brought by it from the Cape. In any estimate, therefore, of the influence of the climate of the Mauritius on the health of the troops, the invaliding from this cause should be omitted. *Mauritius.*

Section III.

Mean Daily Sick.

The average number constantly non-effective from sickness during the year was 74·5, or in the ratio of 41·6 per 1,000 of the strength. The usual information on this head is given in the following Table.

	1864.	1859–63.
Ratio per 1,000 of Strength constantly Sick	41·64	36·53
	Days.	Days.
Mean Sick-Time to each Soldier	15·20	13·33
Average duration of cases of Disease	21·08	15·55

This shows an increase in 1864 in all these particulars. Compared with the results for 1863, however, the difference in the average duration of the cases is very trifling.

Section IV.

On the Influence of Age on the Mortality.

The following Table shows the influence of age on the mortality of the troops. The numbers living and deaths at each age, in quinquennial periods, are stated in Abstract No. XXII of Appendix.

	Under 20.	20–24.	25–29.	30–34.	35–39.	40 and upwards.
Ratio of Deaths per 1,000 of Strength:						
1864	6·56	6·56	11·25	22·22	18·53	125·00
1859–63 ..	10·18	21·24	20·18	40·06	52·24	..

The high rates in the period 1859–63 depend of course on the mortality from epidemic cholera in 1862. The ratios between 20–24 and 25–29 closely approximate, but this is due to the same disturbing cause. Had that year been omitted they would have shown a more regular progression, but at the same time a much greater increase with the advance of life than among troops at home.

IX.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF CEYLON.

Section I.

Sickness and Mortality.

1.—White Troops.

Ceylon. In the end of December a Battery of the 2nd Brigade Royal Artillery arrived from England to relieve one of the 12th Brigade, which had completed its tour of service in the Island. With this exception there was no change in the Force employed.

The average strength of the white troops during the year was 867; the admissions into hospital were 1,479, and the deaths 30, including 1 of an invalid at sea on his passage to England. These numbers give the proportion of 1,706 admissions, and 34·59 deaths per 1,000 of mean strength, both higher than in the year 1863.

The following Table shows the admissions and deaths by the different classes of diseases. The details for 1864 are stated in No. XIX of Appendix.

Orders.	White Troops — Diseases.	Strength, 867. Admitted.	Died. At Ceylon.	Died. Of Invalids.	Died. Total	Annual Ratio per 1,000. 1864. Admitted.	1864. Died.	1859–63. Admitted.	1859–63. Died.
	Class I.								
1	Miasmatic Diseases	586	15	..	15	675·9	17·30	606·6	11·13
2	Enthetic ,, ..	114	..	..	..	131·5	..	239·9	·22
3	Dietic ,, ..	62	..	..	..	71·5	..	19·3	·22
4	Parasitic ,, ..	12	..	..	..	13·8	..	3·8	..
	Class II.								
1	Diathetic Diseases ..	8	..	..	..	9·2	..	3·8	·22
2	Tubercular ,, ..	7	2	1	3	8·1	3·46	18·2	4·01
	Class III. Diseases of the—								
1	Nervous System..	42	2	..	2	48·4	2·31	48·9	2·22
2	Circulatory ,, ..	31	1	..	1	35·8	1·15	14·5	·67
3	Respiratory ,, ..	87	3	..	3	100·4	3·46	82·8	·89
4	Digestive ,, ..	130	4	..	4	149·9	4·61	159·1	3·12
5	Urinary ,, ..	4	..	..	..	4·6	..	5·6	·22
6	Reproductive ,, ..	13	..	..	..	15·0	..	17·4	..
7	Locomotive ,, ..	4	..	..	..	4·6	..	4·4	·22
8	Integumentary ,, ..	199	..	..	..	229·5	..	150·2	..
	Class IV.								
4	Diseases of Nutrition	16	..	..	..	18·5	..	6·7	..
	Class V.								
1	Accidents	158	1	..	1	182·2	1·15	127·0	1·11
4	Suicide	..	1	..	1	..	1·15	..	·45
6	Corporal Punishment	6	..	..	..	6·9	..	2·9	..
	Diseases not specified	..	..	..	..	..	..	6·0	..
	No appreciable disease	..	..	..	..	..	..	·2	..
	Total	1,479	29	1	30	1705·8	34·59	1517·3	24·70

The admissions have been considerably above the average, the excess being chiefly in miasmatic and dietic diseases, in those of the respiratory and integumentary systems, and in accidents. The mortality also has been very high, the difference being in miasmatic diseases and those of the respiratory and digestive systems. *Ceylon.*

MIASMATIC DISEASES when subdivided into groups give the following results:—

Diseases.	Admitted	Died.	Ratio per 1,000 of Mean Strength.			
			1864.		1859–63.	
			Admitted	Died.	Admitted	Died.
Eruptive Fevers..	..	..	..	..	1·1	·22
Paroxysmal „	95	..	109·6	..	114·6	·67
Continued „	110	4	126·9	4·61	53·8	·67
Dysentery and Diarrhœa ..	248	8	286·0	9·23	223·2	7·12
Spasmodic Cholera	6	3	6·9	3·46	5·1	1·78
Sorethroat and Influenza ..	17	..	19·6	..	13·6	..
Ophthalmia	42	..	48·4	..	115·3	..
Rheumatism	43	..	49·6	..	75·9	..

Continued Fevers were much in excess of the average. Their prevalence was confined to Colombo, and was greatest in the 25th Regiment during the first six months of the year. They were considered by the Principal Medical Officer to arise mainly from the defective barrack accommodation and general insanitary condition of the Fort of Colombo.

Dysentery and Diarrhœa have also been more prevalent and fatal than on the average of the five preceding years. The greatest proportion in relation to strength occurred among the troops at Trincomalee, but Colombo also furnished a high ratio.

Spasmodic Cholera was very prevalent and fatal among the civil population, but only six cases and three deaths occurred among the white troops—two cases and one death at Colombo, and the rest at Kandy.

Ophthalmia has been much below the average, a result attributable to the removal in 1863 of the regiment in which it had prevailed epidemically, and the non-existence of it in the relieving regiment.

ENTHETIC DISEASES have been much less prevalent than formerly, but we are not informed of any special circumstances to which this may be attributed.

DIETIC DISEASES.—Of the 62 admissions under this class, 60 were from intemperance (*ebriositas*). They were not confined to any corps nor to any station, though rather more numerous at Colombo than elsewhere.

DISEASES OF THE INTEGUMENTARY SYSTEM furnished a large proportion of cases, the excess being chiefly in ulcers. These in many instances were apparently of a scorbutic character, and were attributable to the deficiency of vegetables in the dietary of the soldiers.

ACCIDENTAL AND VIOLENT DEATHS.—One of these was caused by rupture of the kidney in an artillery man, who accidentally fell over the ramparts at Galle; the other was that of a private of the 25th Regiment, who committed suicide with his rifle in barracks at Colombo.

2.—BLACK TROOPS.

The average strength of the Black Troops during the year was 1,417. The admissions into hospital among them were 1,682, and the deaths 46, being in the ratio of 1,187, and 32·47 per 1,000 of the strength.

The classes of diseases by which the sickness and mortality were caused are shown in the following Table, framed from Abstract No. XIX of Appendix:—

Ceylon.

Orders.	Black Troops	Strength 1,417.		Annual Ratio per 1,000 of Mean Strength.			
	Diseases.	Admitted	Died.	1864.		1859–63.	
				Admitted	Died.	Admitted	Died.
	Class I.						
1	Miasmatic Diseases ..	1,086	33	766·4	23·28	632·1	6·58
2	Enthetic „ ..	22	..	15·5	..	31·3	..
3	Dietic „ ..	2	..	1·4	..	1·1	..
4	Parasitic „ ..	64	..	45·2	..	68·2	..
	Class II.						
1	Diathetic Diseases ..	14	1	9·9	·71	2·4	·40
2	Tubercular „ ..	2	2	1·4	1·41	3·4	1·07
	Class III. Diseases of the—						
1	Nervous System ..	21	1	14·8	·71	10·9	·94
2	Circulatory „ ..	4	3	2·8	2·11	1·3	·81
3	Respiratory „ ..	89	2	62·8	1·41	46·6	·94
4	Digestive „ ..	73	1	51·5	·71	33·8	·67
5	Urinary „ ..	2	..	1·4	..	·1	..
6	Reproductive „ ..	10	..	7·1	..	7·7	..
7	Locomotive „ ..	3	..	2·1	..	·7	..
8	Integumentary „ ..	170	..	120·0	..	131·9	..
	Class IV.						
4	Diseases of Nutrition ..	2	1	1·4	·71	1·1	·13
	Class V.						
1	Accidents	117	1	82·6	·71	73·5	·40
4	Suicide	..	1	..	·71	·1	·27
6	Corporal Punishment ..	1	..	·7	..	·5	..
	Diseases not specified ..	..	..	..	..	1·2	..
	Total	1,682	46	1187·0	32·47	1049·9	12·21

The admissions have been above the average of the preceding five years, and the deaths very much in excess of it; miasmatic diseases being the chief cause in both.

Miasmatic Diseases.—The admissions and deaths by the principal diseases constituting this class have been as follows:—

Diseases.	Admitted	Died.	Ratio per 1,000 of Mean Strength.			
			1864.		1859–63.	
			Admitted	Died.	Admitted	Died.
Eruptive Fevers	3	..	2·1	..	11·4	·13
Paroxysmal „	681	4	480·6	2·82	381·4	1·21
Continued „	3	1	2·1	·71	49·2	·27
Dysentery and Diarrhœa ..	109	5	76·9	3·53	57·0	2·41
Spasmodic Cholera	61	23	43·0	16·23	3·5	2·55
Sorethroat and Influenza ..	5	..	3·5	..	2·4	..
Ophthalmia	107	..	75·5	..	68·6	..
Rheumatism	75	..	52·9	..	46·7	..

This Table shows the increase in the admissions to have been chiefly in paroxysmal fevers, dysentery and diarrhœa, and spasmodic cholera, and the great excess of deaths to have been the result of the latter disease. The intermittent was the most prevalent form of fever.

Spasmodic Cholera prevailed extensively among the civil population during the summer months. Among the black troops 50 cases and 18 deaths occurred at Colombo; 6 cases and 4 deaths at Kandy; and 5 cases and 1 death at Badulla. *Ceylon.*

On the 24th of August the first case among the troops at Colombo was admitted, and the second on the following day. On the 3rd of September the next case occurred, and the disease then spread rapidly, both in the barracks of the single men and in the married lines at Kew. Steps were immediately taken to remove a portion of the regiment to Borella, about two miles from Slave Island, on rather higher ground, and with a dry sandy soil, where they were quartered in a long building, formerly a coffee store. The remainder of the married men were put under canvas on the parade ground, while their lines were completely lime-washed and cleansed, and a similar purification of the single men's barracks took place. Great attention was also paid to the detection and treatment of the disease in the premonitory stage of diarrhœa. The disease finally ceased among the troops towards the end of October.

At Kandy cholera is stated to have been prevailing as an epidemic among the civil population from the middle of April till the middle of September, but only 6 cases occurred among the troops of which 4 proved fatal. Of the 6 men attacked, two were at the time prisoners in the provost, and two were patients in hospital.

At Badulla also the disease was epidemic among the civil population, but it can scarcely be said to have extended to the troops, 4 cases and 1 death only having occurred among them.

Enthetic Diseases.—The admissions by veneral diseases continue remarkably low; the result, as pointed out in former reports, of the large proportion of married men in the corps.

Parasitic Diseases though still very high have been reduced considerably below the average—a consequence, it may be hoped, of improved habits of cleanliness.

The other classes do not seem to require special remark.

Section II.

On the Extent of Invaliding.

During the year 59 men of the European force were sent to England as invalids, and 43 were finally discharged the service at Netley. being in the ratio of 68· and 49·6 per 1,000 of the strength. Of the black troops 9 were discharged as invalids in Ceylon, or 6·3 per 1,000.

The disabilities of the invalids are stated in Abstract No. XX of Appendix, from which the following Table has been framed:—

Ceylon.

	White Troops.		Black Troops.
	Invalids sent to England.	Invalids Discharged at Netley.	Discharged as Invalids in Ceylon.
Dysentery	25	1	..
Ophthalmia	..	18	1
Rheumatism	..	1	5
Venereal Diseases	1	2	1
Diathetic „	1	..	..
Tubercular „	5	3	..
Diseases of the—			
Nervous System	8	3	..
Circulatory „	6	1	..
Respiratory „	2	1	1
Digestive „	9	7	1
Reproductive „	..	1	..
Locomotive „	1	..	..
Diseases of Nutrition	..	4	..
Accidents and Violence	1	1	..
Total.. ..	59	43	9
Ratio per 1,000 of Strength { 1864	68·05	49·60	6·35
Ratio per 1,000 of Strength { 1860-63	59·76	20·11	17·67

The number sent home as invalids has been rather above the average, the chief cause of invaliding having been dysentery. The proportion finally discharged the service has also been very high, the principal disability having been ophthalmia. The discharges from the native corps have been much below the average.

Section III.

On the Mean Daily Sick.

The average numbers constantly non-effective from sickness were 63 of the European and 54 of the black troops, being respectively in the proportion of 72·66 and 38·11 per 1,000 of the strength. The usual information on this head is given in the following Table :—

	White Troops.		Black Troops.	
	1864.	1859–63.	1864.	1859–63.
Ratio per 1,000 of Strength constantly sick..	72·66	72·76	38·11	32·75
	days.	days.	days.	days.
Average sick time to each Soldier	26·52	26·56	13·91	11·95
Average duration of cases of Sickness ..	15·55	17·50	11·72	11·38

The results for the white troops correspond very closely with the average, except that there has been a reduction of nearly two days in the duration of the cases. There has been an increase in the mean daily sick of the black troops and in the sick time to each soldier, but the duration of the cases differed very slightly from the average.

Section IV.

Influence of Age on the Mortality.

The following Table, compiled from Abstract No. XXIII of Appendix and previous reports, shows the influence of age on the mortality of white and black troops serving in Ceylon :— *Ceylon.*

Ages	Under 20.	20–24.	25–29.	30–34.	35–39.	40 and upwards.
WHITE TROOPS.						
Ratio per 1,000 of Strength { 1864 ..	16·53	25·64	41·32	64·52	55·56	..
{ 1860–63	..	14·04	23·46	26·55	45·45	200·00
BLACK TROOPS.						
Ratio per 1,000 of Strength { 1864 ..	27·24	25·64	41·32	64·52	55·56	..
{ 1860–63	7·32	10·95	14·62	9·37	18·87	15·62

This Table shows a rapid increase in the mortality of both classes of troops with the advance of age. Among the black troops the ratio at the age under 20 was unusually high in 1864. There is also a marked reduction in the ratio, at the ages 30–34, on the average of the four preceding years—a result probably of the opportunity afforded on the termination of the first period of service of getting rid of men of broken constitution or who have been found unequal to the duties and fatigues of the service.

X.—ON THE HEALTH OF THE TROOPS IN THE AUSTRALASIAN COLONIES.

Section I.

Sickness and Mortality.

I. AUSTRALIA AND TASMANIA.

THE Force employed in Australia and Tasmania during the year consisted of a battery of Royal Artillery and detachments of the Royal Engineers the 1st Battalion 12th and the 40th Regiments. The average strength was 367, the admissions into hospital were 268, and the deaths were 5, including one of an invalid who had been sent home to England. These numbers give the proportion of 730 cases and 13·60 deaths per 1,000 of the strength, the first being above and the second much under the ratio in 1863. *Australia.*

The admissions and deaths by classes of diseases are shown in the following Table, framed from Abstract No. XXIV of Appendix :—

Australia.

Average Strength .. 367

Orders.	Classes of Diseases.	Australia and Tasmania. 1864. Admitted.	Died. In the Colony.	Died. Of Invalids.	Total Deaths.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	1859–63. Ratio per 1,000. Admitted.	1859–63. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases ..	52	..	..	..	141·7	..	219·3	2·19
2	Enthetic „ ..	43	..	..	..	117·2	..	112·9	..
3	Dietic „ ..	16	..	..	..	43·6	..	22·9	·18
4	Parasitic „ ..	4	..	..	..	10·9	..	2·4	..
	Class II.								
1	Diathetic Diseases ..	15	..	..	..	40·9	..	5·3	·36
2	Tubercular „ ..	1	1	1	2	2·7	5·44	16·7	5·46
	Class III. Diseases of the—								
1	Nervous System	34	..	..	..	92·6	..	24·0	2·00
2	Circulatory „	5	..	..	..	13·6	..	12·6	2·37
3	Respiratory „	8	..	..	..	21·8	..	53·1	1·09
4	Digestive „	16	..	..	..	43·6	..	47·1	·55
5	Urinary „	..	1	..	1	..	2·72	4·6	·55
6	Reproductive „	3	..	..	..	8·2	..	1·8	..
7	Locomotive „	1	..	..	..	2·7	..	2·7	..
8	Integumentary „	20	..	..	..	54·5	..	70·1	..
	Class V.								
1	Accidents	48	1	..	1	130·8	2·72	99·8	1·09
4	Suicide	..	1	..	1	..	2·72	..	·18
6	Corporal Punishment	2	..	..	..	5·4	..	2·0	..
	Diseases not specified	..	..	..	..	..	..	12·0	·18
	No appreciable Disease	..	..	..	..	..	..	·9	..
	Total	268	4	1	5	730·2	13·60	710·2	16·20

The admissions have been slightly above the average of the five preceding years.

Miasmatic Diseases have been considerably under the average. When subdivided they give the following results:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Strength. 1864. Admitted.	1864. Died.	1860–63. Admitted.	1860–63. Died.
Eruptive Fevers	1	..	2·7	..	1·1	..
Paroxysmal „	4	..	10·9	..	3·8	·18
Continued „	8	..	21·8	..	22·2	1·27
Dysentery, Diarrhœa, and Cholera	12	..	32·7	..	41·5	·55
Sorethroat and Influenza ..	2	..	5·4	..	48·2	·18
Ophthalmia	6	..	16·3	..	44·0	..
Rheumatism	11	..	30·0	..	48·2	..

The most marked reduction has been in sorethroat and influenza and in ophthalmia.

The decrease in miasmatic diseases has been counterbalanced by an

increase in dietic and diathetic diseases, diseases of the nervous system, and accidents, but the Force employed during the year has been so small that no positive deductions can be drawn from these variations. In the dietic class, intemperance (*ebriositas*), in the diathetic, lumbago, in the diseases of the nervous system, epilepsy and neuralgia, and in the class of accidents, contusions were the chief causes of admission. *Australia.*

II. New Zealand.

In January the 68th Regiment arrived in New Zealand from Birmah; in the end of the same month a battery of the 4th Brigade Royal Artillery, and in February the 4th Battalion Military Train joined from England. In other respects the Force employed remained as in the end of the previous year. *New Zealand.*

The average strength of the troops during the year was 9,468, the admissions into hospital amounted to 6,825, the deaths in hospital were 122, out of hospital 84, and of invalids on their passage home or at the Invalid Depôt prior to being discharged, 12, making a total of 218. These numbers give the proportion of 721 admissions and 23·02 deaths per 1,000 of the strength, the former being in excess of and the latter almost the same as in 1863. During greater part of the year a large portion of the force was employed on field service, and to the casualties incident to this the high rate of mortality is to be attributed.

The sickness and mortality in each of the corps employed were as follows:—

Corps.	Average Annual Strength.	Admissions into Hospital.	Deaths.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted	Died.
Royal Artillery	397	221	2	5	..	7	557	17·63
„ Engineers	88	30	..	..	..	..	341	..
Military Train, 4th Batt.	245	287	5	1	..	6	1,171	24·49
1st Batt. 12th Regiment	671	587	7	7	..	14	875	20·86
2nd Batt. 14th „	1,099	693	6	2	1	9	631	8·19
2nd Batt. 18th „	911	944	14	12	..	26	1,036	28·54
40th Regiment	882	480	8	6	1	15	544	17·00
43rd „	746	585	27	15	6	48	784	64·34
50th „	791	495	7	7	2	16	626	20·23
57th „	883	553	7	8	..	15	626	16·99
65th „	850	436	12	8	2	22	513	25·88
68th „	827	623	13	5	..	18	753	21·77
70th „	864	772	7	7	..	14	893	16·20
Various Staff Corps	214	119	7	1	..	8	556	37·38

Considering that the troops were employed on field service during nearly all the time under review, the sickness and mortality cannot be regarded as excessive. The highest ratio of admissions occurred in the Military Train, and is attributed to the exposure of the men to wet and cold during the winter months on convoy duty between Auckland and Drury. The very high mortality in the 43rd Regiment was partly due to losses in action, which amounted to 19, and partly to the effects of their previous Indian service, as shown in the deaths from dysentery and hepatic disease both in New Zealand and among the invalids sent home. The ratio of deaths in the Commissariat, Hospital, and other Staff Corps is also high, but this is probably an accidental irregularity resulting from the small number of men under observation. In the preceding year no deaths occurred among them.

The diseases by which the admissions and deaths were caused are stated in

New Zealand. Abstract No. XXIV of Appendix. The following Table shows the results by classes of diseases.

Orders.	Diseases.	Admissions.	Deaths. In New Zealand.	Deaths. Of Invalids.	Deaths. Total.	Ratio per 1,000 of Mean Strength. 1864. Admitted.	1864. Died.	1859-63. Admitted.	1859-63. Died.
	Average Strength ..	9,468.							
	Class I.								
1	Miasmatic Diseases ..	2,661	49	3	52	274·7	5·49	200·8	1·11
2	Enthetic „ ..	238	..	..	..	25·1	..	25·5	..
3	Dietic „ ..	128	1	..	1	13·5	·11	10·8	·42
4	Parasitic „ ..	210	..	..	..	22·2	..	14·4	..
	Class II.								
1	Diathetic Diseases ..	72	1	..	1	7·6	·11	5·1	·16
2	Tubercular „ ..	91	13	3	16	9·6	1·69	7·7	1·95
	Class III. Diseases of the—								
1	Nervous System ..	202	8	1	9	21·3	·95	21·2	·79
2	Circulatory „ ..	97	15	1	16	10·3	1·69	6·7	1·00
3	Respiratory „ ..	484	11	1	12	51·1	1·26	57·7	·79
4	Digestive „ ..	352	8	1	9	37·2	·95	30·4	·68
5	Urinary „ ..	26	2	1	3	2·8	·32	2·3	·26
6	Reproductive „ ..	62	..	..	..	6·6	..	5·4	..
7	Locomotive „ ..	41	..	..	..	4·3	..	2·8	..
8	Integumentary „ ..	779	..	1	1	82·3	·10	77·1	·16
	Class IV.								
4	Diseases of Nutrition ..	16	..	..	..	1·7	..	·5	..
	Class V.								
1	Accidents	899	34	..	34	94·9	3·59	87·8	1·84
2	In Battle	232	61	..	61	24·5	6·44	13·8	6·69
3	Homicide	3	1	..	1	·3	·11	·1	·05
4	Suicide	2	2	..	2	·2	·21	·1	..
5	Execution	..	..	..	..	..	..	..	·05
6	Corporal Punishment ..	290	..	..	..	30·6	..	13·0	..
	Diseases not specified ..	..	..	..	..	..	..	3·9	·11
	Malingering	..	..	..	..	..	..	·1	..
	Total	6,825	206	12	218	720·8	23·02	587·2	16·06

Although the admissions have been much above the average they have been remarkably low considering that a large proportion of the Force was on field service during greater part of the year. The increase has been chiefly in miasmatic diseases, in injuries received in battle, and in corporal punishment. The mortality also has been above the average, the difference being principally in miasmatic diseases and accidents.

Miasmatic Diseases have been more prevalent and much more fatal than on the average of the five preceding years. When subdivided they give the following results.

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Strength.			
			1864.		1859–63.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	4	1	·4	·10	..	..
Paroxysmal „	45	2	4·7	·21	6·1	..
Continued „	631	23	66·6	2·43	16·3	·58
Dysentery, Diarrhœa, and Cholera	871	26	92·0	2·75	45·8	·47
Sorethroat and Influenza ..	194	..	20·5	..	32·6	..
Ophthalmia	379	..	40·0	..	54·4	..
Rheumatism	373	..	39·4	..	32·8	..

This Table shows the increase in the admissions to have been caused by the prevalence of continued fevers, dysentery and diarrhœa, and, though to a much less extent, of rheumatism. They were attributed principally to the exposure of the men on field service, to the vicissitudes of the weather, to improper food, and to intemperance. Half of the mortality by dysentery and diarrhœa occurred in the 43rd Regiment, and was due in a great measure to its previous service in India.

Ophthalmia was considerably under the average; its prevalence was greatest in the 2nd Battalion 14th and the 50th Regiment, while the 40th and 70th, in which the disease had been a source of very considerable inefficiency in 1863, were comparatively free from it.

ENTHETIC DISEASES continue remarkably low.

ACCIDENTS AND VIOLENCE.—The deaths in action and from the wounds received were fewer than in 1863, but were in almost exactly the proportion of the average of the five years. During the year 43 men were killed in the field and 18 died of their wounds.

The regiments in which these casualties occurred were as follows:—

	Killed.	Died of their Wounds.
Royal Artillery	2	..
1st Battalion, 12th Regiment ..	1	..
2nd „ 18th „ ..	5	4
40th Regiment	6	2
43rd „	14	5
50th „	3	1
57th „	3	..
65th „	2	3
68th „	3	5
70th „	2	..

In 203 cases admitted into hospital the wounds were in the following regions of the body:—

New Zealand.

	Admitted.	Died.
Head	20	11
Face	14	2
Neck	7	1
Chest	30	18
Abdomen	7	3
Back and Spine	3	2
Side and Spine	1	1
Perineum and Genital Organs	2	..
Upper Extremities	62	..
Lower „	49	2
Upper and Lower Extremities	2	..
Head and „ „	1	..
Chest and „ „	1	..
Wounds of Large Arteries	1	1
„ Large Joints	3	..

Besides the 61 deaths by the hand of the enemy, there were 2 by accidental, 1 by homicidal, and 2 by suicidal gunshot wounds. There were also 23 by drowning, 5 by fracture, 1 by choking in endeavouring to swallow a large piece of meat which became firmly impacted in the windpipe, and 3 by sunstroke; making a total of 98 deaths by this class of diseases.

Corporal Punishment. The ratio though still very high was lower than in 1863. Its amount was of course due to the peculiar circumstances in which the Force was placed on field service during the greater part of the year.

Section II.

On the Extent of Invaliding.

Australasia. There were 4 invalids sent to England during the year from Australia and 214 from New Zealand, being in the ratio of 10·9 and 22·6 per 1,000 of the strength. During the same period 67 men were discharged as invalids in the colony, and 128 at Netley, making a total of 195 discharged, or 19·8 per 1,000 of the strength of the troops in the Australasian colonies.

The disabilities of the invalids sent home and of those discharged the service are stated in Abstract No. XXV of Appendix, from which the following classified summary has been prepared:—

Australasia.

Diseases.	Invalids sent to England.		Invalids Discharged the Service.	
	From Australia.	From New Zealand.	In Australasia.	In England.
Paroxysmal Fevers	..	1	..	..
Ophthalmia	..	22	3	18
Dysentery and Diarrhœa	..	7	..	..
Rheumatism	1	19	7	5
Venereal Diseases	..	8	..	2
Dietic „	..	1	..	..
Parasitic „	..	1	..	..
Diathetic „	1	1	1	..
Tubercular „	..	36	6	24
Diseases of the—				
Nervous System	2	16	3	9
Circulatory „	..	11	12	12
Respiratory „	..	11	5	7
Digestive „	..	5	3	1
Urinary „	..	1	1	1
Reproductive „	..	..	..	1
Locomotive „	..	1	2	5
Integumentary „	..	4	4	1
Diseases of Nutrition	..	3	..	13
Accidents, &c.	..	8	10	3
Wounds in Battle	..	58	10	26
Total	4	214	67	128
Ratio per 1,000 of Mean Strength .. .. { 1864.	10·90	22·60	6·81	13·01
{ 1861–3	40·82	19·13	1·75	11·73

Wounds received in action have been the most frequent cause of disability both of the invalids sent home and of those discharged the service. Tubercular diseases rank next in frequency, and ophthalmia also holds a prominent place.

Section III.

Mean Daily Sick.

The average number constantly non-effective from sickness during the year was 12 in Australia, and 403 in New Zealand. The usual deductions on this head are given in the following Table:—

	Australia and Tasmania.		New Zealand.	
	1864.	1859–63.	1864.	1861–3.
Ratio per 1,000 constantly sick ..	32·70	34·05	42·56	30·96
	Days.	Days.	Days.	Days.
Average sick time to each soldier ..	11·93	12·42	15·54	11·30
Average duration of cases	16·34	17·59	21·55	19·52

The mean daily sick in Australia has been slightly under the average, but the difference is probably only an irregularity from the small number under

Australasia. observation. There has been an increase in New Zealand due, no doubt, to the same causes which gave rise to the increase in the admissions into hospital. The low ratio of sick, however, with an army which was on field-service during the greater part of the year affords, as was remarked in a previous report, a most striking proof of the great salubrity of the climate.

Section IV.

On the Influence of Age on Mortality.

The ages of the troops serving in Australasia, and the deaths at each age in quinquennial periods are stated in Abstract No. XXVI of Appendix of which the following Table gives the results:—

		Under 20 Years.	20–24.	25–29.	30–34.	35–39.	40 and Upwards.
Ratio of deaths per 1,000 living ..	1864 ..	6·92	17·18	22·51	26·31	36·23	45·46
	1859–63	2·59	13·37	15·27	14·32	25·84	44·44

This Table shows a progressive increase in the mortality with the advance of age, except at the period 30–34 on the average of five years. The irregularity at that period and the reduction in the ratio is probably due to the influence of the discharges of men who have completed their first term of service.

IX.—ON THE HEALTH OF THE TROOPS SERVING IN CHINA AND JAPAN.

I. China.

Section I.

Sickness and Mortality.

China. The troops employed in China during the year remained the same as at the end of 1863, except that the 8th Battery 2nd Brigade Royal Artillery arrived from England in the beginning of September. In the end of June the 2nd Battalion 20th Regiment, with the exception of a small detachment left at Stanley, proceeded to Japan, and was followed in September by a wing of the 67th from Shanghai, and detachments of Royal Artillery and Engineers, Although Japan is included in the same military command as China, it has been considered advisable, for obvious reasons, to keep separate the details relative to the health of the troops in these two divisions.

1. White Troops.

The average strength of the white troops in China during the year 1864 was 2,101; the admissions into hospital were 4,119 and the deaths 84; to which must be added 9 of invalids on their passage home, or while awaiting their

discharge at Netley. These numbers give 1,960 admissions, and 44·74 deaths per 1,000 of mean strength; both considerably under the proportion in 1863. *China.*

The following Table shows the admissions and deaths in the various corps:—

Regiments.	Mean Strength.	Admitted into Hospital.	Died.				Ratio per 1,000.	
			In Hospital.	Out of Hospital.	Of Invalids.	Total.	Admitted.	Died.
Royal Artillery	284	552	8	2	3	13	1943·7	45·77
Royal Engineers..	73	151	6	..	..	6	2068·5	82·19
2nd Battalion 20th Regiment ..	323	588	8	2	..	10	1820·4	30·96
67th Regiment	725	1,126	22	3	2	27	1553·1	37·24
99th „	729	1,370	22	4	4	30	1879·3	41·15

In addition to the deaths stated in this Table, one occurred among the men of the Army Hospital Corps, and six among those of the Commissariat Staff Corps.

The sickness has been lowest in the 67th Regiment, which occupied Shanghai, and the mortality lowest in the 2nd Battalion 20th Regiment; but this was probably the result of its removal from Hong Kong in the end of June—the period when both the prevalence and intensity of disease are on the increase. The very high ratio of deaths in the Royal Engineers may probably be an accidental irregularity due to the small number under observation.

In the present Report we are unable to separate the troops into those in South and North China. Dr. Dick, the Principal Medical Officer, says in his Report, "The movements of the troops have been so frequent and extensive in the Command during the year, that the arrangement by stations must inevitably have led to fallacious conclusions, because it would have shown only the stations at which diseases manifested themselves, and not those at which they really originated." In accordance with this opinion he furnished the Returns by regiments, and not by stations.

The following Table shows the admissions into hospital and deaths among the white troops serving in China generally: the detailed diseases will be found in Abstract No. XXIV of Appendix.

Order.	Diseases.	Admitted.	Died.			Annual Ratio per 1,000.					
						1864.		South China. 1859–63.		North China. 1861–63.	
			In China.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Strength	2,101.									
	Class I.										
1	Miasmatic Diseases . ..	2,453	46	6	52	1167·5	25·23	1244·2	24·10	949·3	60·70
2	Enthetic „	496	..	..	..	236·1	..	485·5	..	230·4	..
3	Dietic „	107	..	..	..	50·9	..	37·9	·42	31·0	·30
4	Parasitic „	27	..	..	..	12·9	..	5·2	..	10·9	..
	Class II.										
1	Diathetic Diseases	11	1	1	2	5·2	·95	4·8	..	5·7	·60
2	Tubercular „	39	3	1	4	18·6	1·90	9·6	1·14	3·7	1·64
	Class III. Diseases of the—										
1	Nervous System.. ..	90	7	..	7	42·8	3·33	31·6	2·39	38·0	2·69
2	Circulatory „	13	2	..	2	6·2	·95	12·7	·63	6·7	1·64
3	Respiratory „	116	2	1	3	55·2	1·43	100·8	1·66	108·7	2·54
4	Digestive „	196	7	..	7	93·3	3·33	117·1	2·18	95·5	4·03
5	Urinary „	8	..	..	..	3·8	..	1·9	·10	1·9	..
6	Reproductive „	32	..	..	..	15·2	..	8·2	..	4·8	..
7	Locomotive „	5	..	..	..	2·4	..	5·3	..	2·8	..
8	Integumentary „	252	..	..	..	119·9	..	145·9	·21	81·7	·15
	Class IV.										
4	Diseases of Nutrition ..	45	3	..	3	21·4	1·43	33·2	·83	2·1	..
	Class V.										
1	Accidents	220	9	..	9	104·7	4·29	96·9	1·87	71·7	4·62
2	Battle	..	..	..	..	..	..	..	..	1·7	·45
3	Homicide	..	4	..	4	..	1·90	..	·10	..	..
4	Suicide	..	..	..	..	..	..	..	·10	..	·45
6	Corporal Punishment ..	6	..	..	..	2·9	..	3·3	..	6·0	..
	Diseases not specified ..	3	..	..	..	1·5	..	27·6	·21	5·7	·30
	Total ..	4,119	84	9	93	1960·5	44·74	2321·7	35·94	1658·3	80·11

The admissions have been lower than, but the deaths in excess of, the average of South China; the increase in the latter being most marked in the class of accidents, and the decrease in the former in venereal diseases. The admissions have been higher, and the deaths much lower than the average in North China; the difference in both being chiefly in miasmatic diseases. China.

Miasmatic Diseases.—The prevalence of the principal groups in this class has been as follows:—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 of Strength. China. 1864. Admitted.	China. 1864. Died.	South China. 1859-63. Admitted.	South China. 1859-63. Died.	North China. 1861-63. Admitted.	North China. 1861-63. Died.
Eruptive Fevers	8	3	3·3	1·43	·5	..	14·2	1·94
Paroxysmal „	967	6	420·3	2·85	583·7	8·41	270·2	2·98
Continued „	701	4	333·6	1·90	245·5	2·91	169·0	7·46
Dysentery and Diarrhœa ..	512	22	243·7	10·47	210·7	11·64	333·6	24·61
Spasmodic Cholera ..	35	17	16·7	8·09	3·3	2·91	36·7	23·57
Sorethroat and Influenza ..	51	..	24·3	..	16·2	..	10·4	..
Ophthalmia	65	..	30·9	..	100·3	..	66·7	..
Rheumatism	85	..	39·5	..	70·1	·10	46·2	·15

Compared with the average of previous years in South China, there has been a decrease in paroxysmal, but an increase in continued fevers, and also in dysentery and diarrhœa. The admissions by these three groups have been very numerous, being equal to the entire strength in the Command; or, in other words, had they been equally distributed, every man would have been once in hospital during the year with one or other of the diseases comprised in them. The mortality has been lower than formerly by all the groups, except spasmodic cholera; and even with regard to it, the ratio has been little more than one-third of that of the previous period in North China.

The very high ratio of admissions by fevers was attributed, in a great measure, to the occupation of Kowloon as a quarter during the last three months of the year by the 99th Regiment. At the time this corps was removed to it from Hong Kong, extensive cuttings and excavations were in progress at Kowloon, and the usual result followed of a very great increase in the cases of fever and bowel affections. In illustration of this it may be stated, that in the 99th Regiment the admissions into hospital by these diseases during the first nine months, when a detachment only was stationed at Kowloon, the head-quarters being at Hong Kong, and the last three months, when the whole regiment was at the former station, were as follows:—

	9 Months—January–September.	3 Months—October–December.
Fevers—Paroxysmal	234	339
„ Continued	82	168
Dysentery and Diarrhœa	55	75

A full report on the sanitary condition of Kowloon, and the circumstances under which this great prevalence of disease occurred in 1864, will be found at page 360 of the Report by the Head of the Sanitary Branch in the 5th volume of these Reports, being the volume for 1863. It appears unnecessary, therefore, to enter into further detail on the subject.

Cholera can hardly be said to have prevailed as an epidemic: 7 deaths occurred at Shanghai, 7 at Hong Kong, and 3 at Kowloon.

Ophthalmia was much under the previous average.

China. ENTHETIC DISEASES show a very great reduction upon the previous average of South China.

ACCIDENTAL AND VIOLENT DEATHS were numerous. Four men were murdered, 4 drowned, 4 died by sunstroke, and 1 of concussion of the spine, caused by a fall from a pony. Of the murdered men, 3 were stabbed, and 1 shot.

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2. NATIVE OR ASIATIC TROOPS.

These consisted of Gun Lascars and the 22nd Bombay Native Infantry at Hong Kong, and the 29th Bombay Native Infantry at Shanghai. Their average strength was 1,553; the admissions into hospital were 1,683, and the deaths 40. These numbers give the proportion of 1,084 admissions, and 25·75 deaths per 1,000 of mean strength.

The diseases by which the admissions and deaths were caused, are stated in Abstract No. XXIV of Appendix, of which a classified summary is given in the following Table:—

Orders.	Diseases.	1864. Strength, 1,553. Admitted.	Died.	Ratio per 1,000. Admitted.	Died.	1861–63. Ratio per 1,000. Admitted.	Died.
	Class I.						
1	Miasmatic Diseases ..	1,056	17	680·0	10·95	890·1	15·74
2	Enthetic „ ..	190	1	122·3	·64	78·7	·62
3	Dietic „ ..	2	..	1·3	..	1·7	..
4	Parasitic „ ..	29	..	18·7	..	13·3	..
	Class II.						
1	Diathetic Diseases ..	12	1	7·7	·64	10·3	·31
2	Tubercular „ ..	9	3	5·8	1·93	2·2	·77
	Class III. Diseases of the—						
1	Nervous System	26	..	16·7	..	17·7	·16
2	Circulatory „	2	1	1·3	·64	·3	·31
3	Respiratory „	106	9	68·3	5·80	80·4	2·18
4	Digestive „	63	1	40·6	·64	50·2	·94
5	Urinary „	3	..	1·9	..	1·7	..
6	Reproductive „	7	..	4·5	..	·3	·16
7	Locomotive „	6	..	3·9	..	1·4	·16
8	Integumentary „	40	..	25·8	..	66·6	..
	Class IV.						
4	Diseases of Nutrition.	71	7	45·7	4·51	12·8	2·49
	Class V.						
1	Accidents	59	..	38·0	..	61·9	·62
2	Battle	1	..	·6	..	1·9	·16
3	Homicide	..	..	..	..	..	·16
4	Suicide	..	..	..	..	..	·16
5	Execution	..	..	..	..	..	·16
6	Corporal Punishment.	1	..	·6	..	1·1	..
	Diseases not specified	..	..	..	..	·8	..
	Total ..	1,683	40	1083·7	25·75	1293·9	25·10

This shows the admissions to have been considerably under, and the deaths nearly the same as the average of the preceding three years. The reduction in

the admissions has been chiefly in miasmatic diseases, but has also extended to those of the respiratory, digestive, and integumentary systems, and to accidents; while there has been a marked increase in venereal diseases and diseases of nutrition. There has been a great reduction in the deaths by miasmatic diseases; but this has been counterbalanced by an increase in those by diseases of the respiratory system and of nutrition. *China.*

Miasmatic Diseases.—The admissions and deaths by the principal groups of diseases composing this class have been as follows:—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength.			
			1864.		1861–63.	
			Admitted.	Died.	Admitted.	Died.
Eruptive Fevers ..	3	..	1·9	..	2·5	..
Paroxysmal „ ..	659	2	424·3	1·29	551·0	2·49
Continued „ ..	25	4	16·1	2·57	18·5	1·09
Dysentery and Diarrhœa	168	5	108·2	3·22	174·4	7·79
Spasmodic Cholera ..	12	6	7·7	3·86	15·0	3·90
Sorethroat and Influenza	8	..	5·2	..	6·9	..
Ophthalmia	16	..	10·3	..	10·3	..
Rheumatism	142	..	91·4	..	105·4	·31

This Table shows the reduction in the admissions to have taken place chiefly in paroxysmal fevers, and dysentery and diarrhœa, and that in the deaths almost exclusively in the latter group.

The admissions by rheumatism, although somewhat under the former average, are greatly in excess of the proportion which occurs among the white troops in the same Command.

Parasitic Diseases have been in excess of the previous high average, the cause being the prevalence of itch. Three cases of Guinea-worm occurred in the 22nd Bombay Native Infantry, a corps in which the admissions from the same cause were much more numerous in 1863.

Diseases of the Respiratory System proved very fatal. Of the 9 deaths, 8 occurred at Shanghai in the 29th Bombay Native Infantry, from bronchitis, and are ascribed by the medical officer in charge to "the extremely rapid transitions of temperature to which the climate of Shanghai is subject, especially during the early spring months.

Diseases of Nutrition.—The 7 deaths by this class occurred in the 22nd Bombay Native Infantry, and are returned under the head of *atrophia*. No information respecting them has been given in the report of the medical officer in charge; but it is probable they were the result of repeated attacks of malarious fever.

II. Japan.

In the end of January, two companies of the 2nd Battalion 20th Regiment were sent from China to Japan. On the 14th of July the head-quarters and remainder of the regiment arrived at Yokohama from Hong Kong, and were followed by a wing of the 67th Regiment from Shanghai, and detachments of Royal Artillery and Engineers. The troops were quartered at Yokohama. The mean *annual* strength was 528; the admissions into hospital were 901, and the deaths 26. These numbers give the proportion of 1,706 cases, and 49·24 deaths per 1,000 of mean strength. This high rate of mortality cannot, however, fairly be attributed to the climate of Japan. Eleven of the deaths were caused by cholera, immediately after the arrival of the 20th Regiment from Hong Kong; and as the disease broke out among the troops on the voyage to Japan, it seems a fair inference that it was produced by other causes than the climate of Yokohama. *Japan.*

Japan. The diseases by which the admissions into hospital and deaths were caused are stated in Abstract No. XXIV of Appendix, from which the following Table has been framed :—

Orders.	Diseases.	Average Annual Strength, 528.		Ratio per 1,000.	
		Admitted.	Died.	Admitted.	Died.
	Class I.				
1	Miasmatic Diseases	430	19	814·4	35·99
2	Enthetic „	182	..	344·7	..
3	Dietic „	8	..	15·1	..
4	Parasitic „	8	..	15·1	..
	Class II.				
2	Tubercular Diseases	3	..	5·7	..
	Class III.				
	Diseases of the—				
1	Nervous System	6	..	11·4	..
2	Circulatory „	1	..	1·9	..
3	Respiratory „	27	3	51·1	5·68
4	Digestive „	16	..	30·3	..
5	Urinary „	1	..	1·9	..
7	Locomotive „	4	..	7·6	..
8	Integumentary „	126	..	238·6	..
	Class IV.				
4	Diseases of Nutrition	1	..	1·9	..
	Class V.				
1	Accidents	87	4	164·8	7·57
5	Corporal Punishment	1	..	1·9	..
	Total	901	26	1706·4	49·24

MIASMATIC DISEASES have given rise to nearly half the admissions and to three-fourths of the deaths. When subdivided into groups, they offer the following results :—

Diseases.	Admitted.	Died.	Annual Ratio per 1,000.	
			Admitted.	Died.
Eruptive Fevers	17	2	32·2	3·79
Paroxysmal „	125	..	236·7	..
Continued „	119	2	225·4	3·79
Dysentery and Diarrhœa	75	4	142·0	7·58
Spasmodic Cholera	13	11	24·6	20·83
Sorethroat and Influenza	24	..	45·5	..
Ophthalmia	19	..	36·0	..
Rheumatism	30	..	56·8	..

Eruptive Fevers.—All the admissions under this class were by small-pox, which was very prevalent among the native population of Yokohama. One case and one death occurred in the Royal Artillery, the other cases were in the

20th Regiment. The men attacked are stated to have all borne marks of previous vaccination. *Japan.*

Fevers.—The amount of Fevers, both paroxysmal and continued, and of dysentery and diarrhœa, has been very high; but this can hardly be attributed to the climate of Japan, for the 20th Regiment had been quartered at Kowloon during the first six months of the year, where the men had acquired a liability to these forms of disease. In like manner the 67th had acquired a liability to malarious diseases during its service at Shanghai.

Spasmodic Cholera broke out in the 20th Regiment on its passage from China to Japan, and three deaths occurred on board the "Chanticleer." A few days after the regiment landed at Yokohama, the disease again broke out, and between the 21st and 28th of July caused nine deaths. Two fatal cases occurred subsequently, one in the middle of August and the other in the beginning of September. The disease was confined to the 20th Regiment, no cases having occurred among the other troops or the civil population.

Accidental and Violent Deaths.—The proportion of these has been very high: one man was drowned, one died from fracture of the skull, and two are returned under the head of asphyxia, one of whom was found dead in the streets of Yokohama, and the other in his bed; but no details are given respecting them in the reports of the medical officers.

In consequence of the marked influence which the previous service of the troops in China had upon their health, and the circumstance of their being stationed in Japan during part of the year only, it seems unnecessary to offer any further remarks upon the diseases from which they suffered.

Section II.

On the Extent of Invaliding.

During the year there were 109 men of the White Troops in China and Japan sent to England, and 46 of the Asiatic Troops to India, as invalids; being in the annual ratio of 51·9 and 27·3 per 1,000 of mean strength. There were 67 invalids finally discharged the service at Netley, or 31·9 per 1,000. We have no information respecting the discharges of the Asiatic Troops. *China and Japan.*

The disabilities of the invalids are stated in Abstract No. XXV of Appendix, from which the following classified summary has been prepared:—

China and Japan.

	White Troops		Asiatic Troops
Mean Strength..	2,629		1,553
	Sent as Invalids to England.	Discharged as Invalids in England.	Sent as Invalids to India.
Intermittent Fever	15	4	2
Continued „	2	..	..
Dysentery	26	6	1
Ophthalmia	5	5	1
Rheumatism	4	2	3
Venereal Diseases	7	1	..
Diathetic „	1	3	9
Tubercular „	10	12	2
Diseases of the—			
Nervous System	6	8	1
Circulatory „	3	2	..
Respiratory „	10	10	5
Digestive „	3	2	..
Urinary „	1	1	..
Reproductive „	1	1	..
Locomotive „	1	3	1
Integumentary „	1	..	..
Diseases of Nutrition	10	7	21
Accidents and Violence ..	3	..	..
Total	109	67	46
Ratio per 1,000 of Strength .. 1864 ..	41·46	25·48	27·33
Strength .. 1861-3..	48·84	21·53	10·91

The number invalided home has been under the average of the three preceding years; but there has been a slight increase in the number discharged the service—probably the result of the long-continued residence of the 99th Regiment in this climate, as more than half of the invalids sent home were men of that corps.

Dysentery and intermittent fever were the chief causes of disability, and next to them tubercular diseases and those of the respiratory organs. The cases returned under diseases of nutrition were for the most part the result of repeated attacks of malarious fever.

Section III.

Mean Daily Sick.

China. The average number constantly sick in hospital during the year was, of White Troops, 171, and of Asiatic 77 The following results are based on these numbers —

	European Force.		Asiatic Force.	
	1864.	1861-3.	1864.	1861-3.
Ratio per 1,000 of Strength constantly Sick	81·39	74·26	49·58	49·10
	Days.	Days.	Days.	Days.
Average Sick Time to each Soldier	29·71	27·10	18·10	17·92
Average duration of Cases ..	15·15	14·89	16·70	13·85

This shows an increase in the mean daily sick of the European troops compared with the results of the three preceding years, and in the average sick time to each soldier, and the average duration of the cases. There has been a very slight increase also in these particulars among the Asiatic force.

Section IV.

On the Influence of Age on the Mortality.

The following Table, compiled from Abstract No. XXVII. of Appendix, shows the ratio of mortality at each quinquennial period of life :—

	European Troops.					
	Under 20.	20-24.	25-29.	30-34.	35-39.	40 and upwards.
Strength on 1st January..	48	1,158	927	307	99	5
Deaths during year ..	..	37	46	8	10	2
Ratio of Deaths per 1,000 of Strength :						
1864	..	31·95	49·62	26·06	101·01	400·
1861-3	5·83	45·96	77·10	70·52	165·95	218·75
	Asiatic Troops.					
Strength on 1st January..	221	258	513	317	188	137
Deaths during year ..	..	8	12	9	5	6
Ratio of deaths per 1,000 in 1864 . ..	..	31·01	23·39	28·39	26·60	43·80

This Table shows a rapid increase in the mortality of the European troops with the advance of life, the decrease in the column 30-34 being probably the result of the operation of the Limited Enlistment Act. The returns of the Asiatic troops do not bring out similar results. There are no previous returns of the latter with which to compare those of 1864.

XII. ON THE HEALTH OF THE TROOPS SERVING IN INDIA.

Section I.

Sickness and Mortality.

India. The average strength of European troops serving in the three Presidencies and their dependencies during the year 1864 was 65,102; the admissions into hospital were 99,598, and the deaths 1,428, including 139 among invalids on their passage home or while awaiting their discharge from the service at Netley. These numbers give the proportion of 1,530 admissions and 21·93 deaths per 1,000 of mean strength, being lower than in any of the four preceding years.

The sickness and mortality in each of the Presidencies is shown in the following Table:—

	Average Strength.	Admissions into Hospital.	Deaths.			Ratio per 1000 of Mean Strength.			
						1864.		1860–63.	
			In India.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
Bengal	39,936	62,174	819	82	901	1,557	22·56	1,896	34·48
Madras	12,993	19,986	266	36	302	1,538	23·24	1,318	20·43
Bombay	12,173	17,438	204	21	225	1,432	18·48	1,774	24·10

Compared with 1863 these results show a decrease in the admissions into hospital in Bengal and Bombay, and in the deaths in Bengal, but an increase in the admissions in Madras, and the deaths in Madras and Bombay.

We shall now submit the information respecting the health of the troops in each of the Presidencies.

I. Bengal.

Bengal. The diseases by which the admissions and deaths were caused are stated in Abstract No. XXVIII of Appendix; the classified results are shown in the following Table:—

Bengal.

Orders.	Diseases.	1864. Strength, 39,936. Admitted.	Died. In India.	Died. Of Invalids.	Died. Total.	1864. Ratio per 1,000. Admitted.	Died.	1860-63. Ratio per 1000. Admitted.	Died.
	Class I.								
1	Miasmatic Diseases.. ..	31,899	343	24	367	798·7	9·1	1084·9	21·37
2	Enthetic „	9,646	13	..	13	241·5	·33	323·1	·31
3	Dietic „	475	5	..	5	11·9	·12	9·4	·14
4	Parasitic „	350	1	..	1	·8	·02	6·9	..
	Class II.								
1	Diathetic Diseases	317	1	1	2	7·9	·05	5·7	·21
2	Tubercular „	433	69	28	97	10·8	2·43	11·1	2·54
	Class III. Diseases of the—								
1	Nervous System.. ..	1,406	76	2	78	35·2	1·95	34·1	2·17
2	Circulatory „	367	32	7	39	9·2	·98	9·7	·72
3	Respiratory „	2,151	54	5	59	53·9	1·48	54·3	1·02
4	Digestive „	4,967	122	11	133	124·4	3·33	139·2	3·88
5	Urinary „	114	4	..	4	2·9	·10	2·4	·16
6	Reproductive „	718	..	..	..	18·0	..	12·8	·01
7	Locomotive „	252	..	..	..	6·3	..	5·6	·04
8	Integumentary „	4,582	1	..	1	114·7	·02	104·0	·06
	Class IV.								
4	Diseases of Nutrition. ..	328	8	3	11	8·2	·28	7·9	·14
	Class V.								
1	Accidents	4,061	65	1	66	101·7	1·65	77·3	·87
2	Battle	7	9	..	9	} ·2	·22	1·1	·26
3	Homicide	1	2	..	2		·05	..	·02
4	Suicide	..	12	..	12	}	·31	·1	·25
5	Execution	..	..	..	..	..	..	..	·01
6	Corporal Punishment ..	46	..	..	..	1·1	..	1·1	..
	Diseases not specified ..	54	2	..	2	1·3	·05	5·1	·30
	Total..	62,174	819	82	901	1556·7	22·56	1895·8	34·48

This Table shows the reduction of the admissions to have taken place chiefly in miasmatic and enthetic diseases, and of the deaths in miasmatic diseases.

MIASMATIC DISEASES, when subdivided into groups, give the following results:—

Bengal.

Diseases.	Admitted.	Died.	Annual Ratio per 1,000 Strength. 1864. Admitted.	1864. Died.	1860–63. Admitted.	1860–63. Died.
Eruptive Fevers..	106	13	2·7	·33	2·8	·38
Paroxysmal ,, ...	18,209	86	456·0	2·15	537·6	2·20
Continued ,, ...	2,673	31	66·9	·78	177·7	1·73
Dysentery and Diarrhœa	4,978	101	124·6	2·53	146·9	4·54
Spasmodic Cholera..	157	107	3·9	2·68	19·3	11·67
Sorethroat and Influenza	807	..	20·2	..	21·2	·02
Ophthalmia	1,576	..	39·5	..	63·6	..
Rheumatism	2,701	3	67·6	·07	65·1	·09

Eruptive Fevers have been more prevalent than in 1863, though they have not exceeded the average of the last four years. 83 of the admissions and all the deaths were caused by small-pox. The disease may be said to have prevailed as an epidemic in the 7th Dragoon Guards at Muttra, and the 1st Battalion 23rd Regiment at Agra, 13 cases having occurred in each; three of the cases in the former and one in the latter corps proved fatal. It is stated that the three fatal cases in the 7th Dragoon Guards did not bear satisfactory marks of vaccination.

Paroxysmal and Continued Fevers were much below the average of former years, but the reduction in the mortality was confined to the continued fevers.

Dysentery and Diarrhœa were less prevalent than formerly, and the mortality was not greatly above half the average.

Spasmodic Cholera was the disease in which the reduction in the mortality was most striking, the proportion of deaths to the strength not having amounted to one-fourth of the average of the four preceding years. The only stations at which it prevailed to any extent among the European troops were Lucknow and Allahabad. It also attacked the 55th Regiment on the march from Raneegunge to Hazareebaugh. At Lucknow, cholera broke out in September in the 107th Regiment, and the following day in the 36th. The latter corps and three companies of the former, in which cases had occurred, were marched to camp and the disease ceased. 32 cases of cholera and 18 of choleraic diarrhœa occurred in the 36th with 29 deaths, and 22 cases, of which 11 died, in the 107th Regiment. The 5th Lancers, at the same station, had only one case, which, however, terminated fatally. At Allahabad the 77th Regiment had three cases with two deaths in March, two cases with one death in May, and in September 12 cases, of which 10 died. On the last occasion the troops were moved into camp with marked benefit. The surgeon of the regiment states that the disease arose from local causes and was not epidemic at the time among the civil population.

The 55th Regiment arrived at Calcutta from England on the 24th February and 19th and 25th March. The first detachment after being a few days at Calcutta was sent by rail to Raneegunge and marched thence to Hazareebaugh. It lost one man by cholera at Calcutta and one on the march. The second detachment was sent to Raneegunge to await its supply of clothing, but on the third day after its arrival cholera broke out, and the men were marched to Hazareebaugh. The Head Quarters on their arrival were likewise sent to Raneegunge, were attacked by cholera, and were at once moved to Hazareebaugh. The disease continued to prevail in the last two detachments till within a day's march of their destination, when it ceased. The corps had altogether 25 cases with 13 deaths.

At several other stations cholera appeared among the troops, but they were immediately moved into camp and, apparently, with the most satisfactory

result, as the disease ceased, and in none of them could it be said to have become epidemic. *Bengal.*

Ophthalmia.—The Table shows a satisfactory reduction in the amount of ophthalmia compared with the average of the four preceding years. The corps in which the admissions were most numerous were the 101st, 38th, and 54th Regiments, but the medical officers in charge have not assigned any reason for its prevalence in them. It appears to have been of a very mild character.

Enthetic Diseases.—The reduction in the prevalence of venereal diseases which was noticed in last Report has continued, and the ratio in 1864 has been one-fourth under the previous average.

Diseases of the Integumentary System have been rather more prevalent than formerly. The excess has been due in a great measure to the prevalence of the ulcer known as the "Delhi Sore," in the 2nd Battalion 11th Brigade, and in the 38th Regiment which relieved it at Delhi in the end of March. The admissions under the head of "ulcer" in the former corps amounted to 368 in a strength of 912. Ulcers were also unusually prevalent in the 36th Regiment at Lucknow, and in the 97th stationed at Saugor and Nowgong, but the medical officers in charge have not made them the subject of special remark.

Violent Deaths.—Nine deaths are returned as casualties on field service; six of these occurred in the F Battery 25th Brigade Royal Artillery, and three in the 7th Hussars.

In consequence of one of the Quarterly Returns from Bengal not having been received we are unable to give details respecting the sickness and mortality in each of the military divisions. We shall endeavour to furnish this information in a Supplementary Report in the next volume.

The following Table shows the sickness and mortality in each corps in the Bengal Presidency:—

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Ratio per 1000 of Mean Strength.		Stations during the Year.
			In India.	Invalids on board Ship and at Home.	Total.	Admitted.	Died.	
Royal Artillery.								
A Brigade, R. H. A.	50	91	..	..	..	1820·0	..	Only arrived from England in December.
C „ „	857	1,836	16	..	16	2142·4	18·67	1st Battery, Morar, on march; 2nd Battery, Benares; 3rd Battery, Meean-Meer, Meerut, on march; 4th Battery, Meerut, Morar; 5th Battery, Peshawur, Rawul Pindee; 6th Battery, Lucknow.
F „ „	864	1,797	12	..	12	2079·9	13·89	1st Battery, Peshawur, 1 month, Umballa, 11 months; 2nd Battery, on march, Peshawur; 3rd Battery, Umballa, 11 months, Meerut, 1 month; 4th Battery, Peshawur; 5th Battery, Meean-Meer; 6th Battery, Sealkote.
11th Brigade, R. A.	1,056	1,315	20	1	21	1245·3	19·88	1st Battery, Lucknow, 1 month, Fyzabad, 11 months; 2nd Battery, Lucknow; 3rd Battery, Lucknow, 1 month, Seetapore, 11 months; 4th Battery, Bareilly; 5th Battery, Futtyghur; 6th Battery, Jullundur, 3 months, Meerut, 2 months, Delhi, 7 months; 7th Battery, Cawnpore.
16th „ „	961	1,897	33	2	35	1974·0	36·42	1st Battery, Saugor, 11 months, Jubbulpore, 1 month; 2nd Battery, Jubbulpore, 11 months, Saugor, 1 month; 3rd Battery, Hazareebaugh, 11 months, on march, 1 month; 4th Battery, Dinapore; 5th Battery, Allahabad; 6th Battery, Barrackpore, on march; 7th Battery, Barrackpore.
19th „ „	905	2,107	14	..	14	2328·2	15·47	1st Battery, on march, Ferozepore; 2nd Battery, Mooltan; 3rd Battery, Nowshera, on march, Umritsir; 4th Battery, Nowshera, Rawul-Pindee, on marcli; 5th Battery, Meean-Meer, on march, Jullundur; 6th Battery, Derhind, on march, Meean-Meer; 7th Battery, Peshawur.
22nd „ „	793	1,721	17	1	18	2170·2	22·70	1st Battery, Meerut, 2nd Battery, Morar, Jhansi; 3rd Battery, Morar; 4th Battery, Meerut; 5th Battery, Jhansi, Morar; 6th Battery, Agra; 7th Battery, Delhi, Meerut.

Corps.	Average Strength during the Year.	Admitted into Hospital.	Died.			Ratio per 1,000 of Mean Strength.		Stations during the Year.
			In India.	Invalids on board Ship and at Home.	Total.	Admitted.	Died.	
24th Brigade, R.A.	360	731	13	2	15	2030·6	41·67	1st Battery, Govindghur; 2nd Battery, Peshawur, Meean-Meer; 3rd Battery, Meean-Meer, Peshawur; 4th Battery, Fort Michnee, Attock; 5th Battery, Lucknow, on march; 6th Battery, Mooltan.
25th „ „	368	632	16	..	16	1717·4	48·48	1st Battery Delhi; 2nd Battery, Saugor, on march; 3rd Battery, Fort William; 4th Battery, Allahabad, on march; 5th Battery, Agra, field service; 6th Battery, Benares, field service.
Brigade not specified	..	..	..	1	1	..	..	
Artillery Band	38	36	1	..	1	947·4	26·32	
Total Royal Artillery	6,252	12,163	142	7	149	1945·5	23·83	
CAVALRY.								
2nd Dragoon Guards	444	593	10	3	13	1335·6	29·28	Benares, 11 month; Squadron at Cawnpore, 9 months; on march, 1 month.
7th „ „	535	900	5	..	5	1682·3	9·34	On march, 1½ month; Muttra, 10½ months.
5th Lancers	507	713	21	..	21	1406·3	41·42	Lucknow, 12 months.
7th Hussars	626	1,092	17	..	17	1744·4	27·16	Peshawur, 3 months; Campbellpore, 8 months; Squadron at Rawul-Pindee, 7 months; Sealkote, 1 month.
19th „	508	736	8	..	8	1448·8	15·75	Meerut, 12 months.
20th „	531	683	4	..	4	1286·3	7·55	On march, 1½ month; Sealkote, 9 months; Campbellpore, 1½ month.
21st „	566	951	5	1	6	1680·2	10·60	Umballa.
Total Cavalry	3,717	5,668	70	4	74	1524·9	19·91	

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Ratio per 1000 of Mean Strength.		Stations during the Year.
			In India.	Invalids on board Ship and at Home.	Total.	Admitted.	Died.	
INFANTRY.								
7th Foot, 1st Battalion	938	1,066	15	3	18	1136·5	19·19	Camp, 1 month; on march, 1 month; Ferozepore, 10 months.
11th ,, ,, ...	131	191	5	..	5	1458·0	38·17	Arrived from England 28th October; on march and at Fyzabad, 2 months.
12th ,, 2nd Battalion	161	187	4	..	4	1161·5	24·84	Arrived from England October and November; Seetapore and Roy Bareilly.
13th ,, 1st Battalion	19	20	2	1	3	1052·7	15·79	Fort William, embarked for England 13th January.
19th ,, ,, ...	864	811	18	2	20	938·6	23·15	Ferozepore, 2 months; Jullundur, 10 months.
20th ,, ,, ...	930	1,134	17	1	18	1219·1	19·35	Head-Quarters, Roorkee, 12 months; Left wing, Futtyghur, 12 months.
23rd Foot, 1st Battalion..	912	1,500	16	2	18	1644·8	19·74	Agra, 12 months.
27th ,, ...	886	1,465	23	3	26	1653·5	29·34	Dinapore, 12 months.
34th ,, ...	808	1,001	13	3	16	1238·9	19·80	Head-Quarters, Seetapore, 11½ months; on march, ½ month; Wing, Roy Bareilly, 11½ months; on march, ½ month.
35th ,, ...	891	880	10	4	14	987·7	15·71	Fyzabad, 10 months; on march, 2 months.
36th ,, ...	848	2,002	66	..	66	2360·9	77·83	On march, ½ month; Lucknow, 11½ months.
38th ,, ...	827	1,664	21	1	22	2012·1	26·60	Meerut, 2½ months; Delhi, 8 months; on march, ½ month; Camp, 1 month.
42nd ,, ...	824	724	16	4	20	878·6	24·27	On march, 1½ month; Dugshai, 8½ months; on march and Camp, 2 months.
46th ,, ...	873	884	12	..	12	1012·6	13·75	Head-Quarters, Shahjehanpore, 12 months; Wing, Moradabad, 12 months.
48th ,, ...	797	760	18	5	23	953·6	28·86	Dum-Dum, 12 months.
51st ,, ...	986	1,781	11	3	14	1806·3	14·20	Nowshera, 9½ months; Peshawur, 2½ months.
52nd ,, ...	741	1,148	24	4	28	1549·3	37·79	Calcutta, 11½ months; Embarked for England.

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Ratio per 1000 of Mean Strength.		Stations during the Year.
			In India.	Invalids on board Ship and at Home.	Total.	Admitted.	Died.	
54th Foot	870	1,330	17	3	20	1528·7	22·99	Benares, 2 months; Jounpore and Azimghur, 7½ months; on march, 1 month; Calcutta, 1½ month.
55th „	791	968	30	..	30	1223·8	37·93	Arrived from England in March; Hazareebaugh, 7½ months; on march, 1 month; Lucknow, ½ month. Two Companies at Berhampore.
58th „	65	92	3	..	3	1415·4	46·15	Arrived from England in November, Benares.
71st „	800	2,403	5	3	8	3003·8	10·00	Peshawur, 9¾ months; on march, 2¼ months.
77th „	783	1,098	33	3	36	1402·3	45·98	Allahabad, 10¼ months; on march, ½ month; Bareilly, 1¼ month.
79th „	945	1,980	15	1	16	2095·3	16·93	Peshawur and on march, ½ month; Rawul-Pindee, 11½ months.
80th „	941	1,294	17	1	18	1375·1	19·13	Head-Quarters Jhansi, 10½ months; Detachment Gwalior, 9⅝ months; 2 Companies Sipree, 7 months; on march rest of the year.
81st „	724	1,154	10	1	11	1593·9	15·19	Morar, 12 months.
82nd „	902	535	15	1	16	593·1	17·74	Subathoo, 9⅔ months; on march, ⅔ month; Meean-Meer, 1⅔ month.
88th „	908	1,034	25	2	27	1138·8	29·74	Cawnpore, 12 months.
89th „	897	2,061	11	1	12	2297·7	13·38	Mooltan, 12 months.
91st* „	862	1,798	15	2	17	2085·8	19·72	Head-Quarters Jubbulpore, and detachment at Nagode, 12 months.
93rd „	860	932	10	2	12	1083·7	13·95	On march, 2 months; Sealkote, 10 months.
94th „	856	1,440	14	1	15	1682·3	17·52	Meean-Meer, ⅓ month; Kussowlie, detachment Umritsir, Kangra, and Phillour, 11⅔ months.
97th „	925	1,753	16	1	17	1895·1	18·38	Saugor and Nowgong, 12 months.

* No returns were received from the 90th Regiment, which is, therefore, unavoidably omitted from this and all other Tables in this Report.

Bengal.

Corps.	Average Strength for the Year.	Admitted into Hospital.	Died.			Ratio per 1000 of Mean Strength.		Stations during the Year.
			In India.	Invalids on board Ship and at Home.	Total.	Admitted.	Died.	
98th Foot	964	953	13	2	15	988·6	15·56	Umballa, 12 months.
101st ,, ...	919	1,319	8	1	9	1435·3	9·79	On march, ⅔ month; Rawul-Pindee, 11⅓ months.
104th ,, ...	777	839	15	3	18	1079·8	23·17	Bareilly, 9⅔ months; on march and at Jhansi, 2⅔ months.
107th ,, ...	853	924	22	1	23	1083·2	26·96	Lucknow, 10 months; Allahabad, 2 months.
Rifle Brigade, 2nd Battalion	912	2,042	12	1	13	2239·1	14·25	Delhi, 3 months; Meerut, 9 months.
Ditto, 3rd ,, ...	977	1,176	10	..	10	1203·7	10·23	Peshawur, 12 months.
Total Infantry	29,967	43,343	607	66	673	1446·4	22·46	

Bengal.

This shows the sickness and mortality to have been highest in the Artillery, the mortality to have been lowest in the Cavalry, and the sickness in the Infantry. The 71st at Peshawur furnished the highest ratio of admissions of any corps, from the great prevalence of intermittent fever in it, the result of its previous service at that station and the Umbeylah Pass; the mortality, however, was very low, scarcely exceeding that of Infantry at home. The highest ratio of mortality was in the 36th Regiment at Lucknow, and was caused by the epidemic of cholera in the corps as previously stated. In the Cavalry the 7th Hussars at Peshawur had the greatest amount of sickness, and the 5th Lancers at Lucknow the highest mortality. In the Artillery the highest ratio of admissions was in the 19th Brigade, and of deaths in the 25th. Of the former the excess occurred chiefly in the Batteries at Umritsir, Peshawur, Ferozepore, and Mooltan, of the latter, at Delhi and on field service in Bhootan.

II. Madras.

Madras.

As already stated, the average strength of the European Troops in the Madras Presidency and its military dependencies was 12,993, the admissions into hospital were 19,986, and the deaths, including 36 of invalids, were 302; the ratio of admissions, therefore, was 1,538, and of deaths 23·24 per 1,000 of mean strength, both being in excess of the proportion in 1863.

The diseases by which the sickness and mortality were caused are detailed in Abstract No. XXVIII of Appendix; the following Table shows the classified results:—

Madras.

Orders.	Diseases.	Strength, 12,993.				Ratio per 1,000 of Mean Strength.			
			Deaths.			1864.		1860–63.	
		Admitted.	In the Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	Class I.								
1	Miasmatic Diseases ..	7,377	113	23	136	567·8	10·46	537·1	8·33
2	Enthetic „ ..	3,533	6	2	8	271·9	·62	264·8	·36
3	Dietic „ ..	265	2	..	2	20·4	·15	17·7	·11
4	Parasitic „ ..	242	..	..	..	18·6	..	8·8	..
	Class II.								
1	Diathetic Diseases ..	93	3	..	3	7·2	·23	5·1	·17
2	Tubercular „ ..	219	16	4	20	16·8	1·54	16·6	2·00
	Class III. Diseases of the—								
1	Nervous System ..	574	14	1	15	44·2	1·15	33·5	1·59
2	Circulatory „ ..	204	15	1	16	15·7	1·23	14·5	1·20
3	Respiratory „ ..	760	4	1	5	58·5	·38	48·4	·67
4	Digestive „ ..	2,023	48	3	51	155·7	3·93	130·2	3·52
5	Urinary „ ..	48	3	..	3	3·7	·23	2·5	·17
6	Reproductive „ ..	270	..	..	..	20·8	..	14·1	..
7	Locomotive „ ..	85	..	..	..	6·5	..	4·8	·02
8	Integumentary „ ..	2,227	..	..	..	171·4	..	110·1	·15
	Class IV.								
4	Diseases of Nutrition.	91	2	..	2	7·0	·15	5·6	·21
	Class V.								
1	Accidents	1,890	33	1	34	145·4	2·62	96·5	1·52
4	Suicide	1	7	..	7	·1	·53	..	·13
6	Corporal Punishment	61	..	..	..	4·7	..	1·7	..
	No appreciable Disease	23	..	..		1·8	..	..	..
	Diseases not specified.	..	..	..	..	..	..	6·3	·28
	Total	19,986	266	36	302	1538·2	23·24	1318·3	20·43

Both admissions and deaths have been above the average of the preceding years; the former chiefly from diseases of the integumentary system, accidents, respiratory and miasmatic diseases, and the latter from miasmatic diseases and accidents.

MIASMATIC DISEASES when subdivided give the following results:—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength. 1864. Admitted.	1864. Died.	1860–63. Admitted.	1860–63. Died.
Eruptive Fevers	13	2	1·0	·15	·8	·04
Paroxysmal „	2,118	11	163·0	·85	175·4	·71
Continued „	773	26	59·5	2·00	82·3	·95
Dysentery and Diarrhœa	2,354	37	181·0	2·84	150·9	2·21
Spasmodic Cholera..	68	36	5·5	2·77	7·7	3·41
Sorethroat and Influenza	288	..	22·2	..	13·3	..
Ophthalmia	661	..	50·9	..	31·1	..
Rheumatism.	852	..	65·6	..	64·8	·02

The increase in the admissions has taken place in dysentery and diarrhœa, sorethroat and influenza, and ophthalmia, while there has been a decrease in fevers both paroxysmal and continued. The increase in the proportion of deaths has been caused by continued fevers. The 2nd Battalion 21st Regiment at Bangalore furnished a large proportion of the cases of continued fever, 210 admissions having occurred in it, of which 6 proved fatal; but it was remarkably free from intermittent fever, by which there were only 10 admissions. The regiment had been in India only since the end of October 1863.

Cholera did not prevail generally as an epidemic throughout the Command, but it broke out in several regiments, chiefly while on the march. In January four deaths by it occurred in the C Battery 14th Brigade, R.A., on the march from Secunderabad to Kamptee, and three in the 1st Battalion 19th Regiment on the River Setang while proceeding to Tonghoo. In February the 74th Regiment lost eight men in two days in camp at Grundy near Madras. The disease ceased on the regiment being moved to Palaveram. In April a detachment marching from Kamptee to the sanatorium at Chindwarrah lost nine men, and in May three deaths occurred among the troops at Kamptee. The other fatal cases are stated to have been sporadic.

Ophthalmia was considerably above the average owing to its prevalence in a mild form as an epidemic in the 2nd Battalion 21st Regiment at Bellary, in May, June, and July. The total admissions by it in this corps were 264, of which 129 occurred in June. None of the other corps appear to have been affected.

Parasitic Diseases prevailed to rather more than twice the average amount. The excess was in a great measure due to the admissions by guinea-worm, which amounted to 99, or six times as many as in 1863. Of these 93 occurred in the 1st Battalion 18th Regiment at Trimulgherry. The source of the disease in this regiment has not been satisfactorily ascertained, but the surgeon states that he considers the men to have become susceptible to its influence from being in a low state of general health arising from long continued residence at one station, the corps having been six years at Secunderabad without change. A notice on the subject by Surgeon Stewart will be found at page 433 of this volume, in the Report by the Head of the Medical Branch.

Diseases of the Integumentary System were considerably above the average, chiefly from the prevalence of boils (*phlegmon*) and ulcers. The former were very numerous, in the 21st and 76th Regiments, both recently arrived from England.

Accidents and Violence.—In this class 17 admissions under the head of poisoning appear, all of which recovered. 16 of them occurred in the 3rd Battalion 60th Regiment, and are stated to have been cases of "fish poisoning," but no details are given.

At Bellary, in April, a gun limber blew up on parade when the troops were

Madras. marching past, killing 4 men and wounding 7, of whom 1 afterwards died. 14 men were drowned, being 2 less than in the preceding year, and one man was killed by lightning at Bellary. There were 7 suicidal deaths, of which 3 were by fire-arms, 2 by hanging, 1 by sabre wound, and 1 by razor.

The amount of sickness and mortality at the different stations in the Madras Command is shown in the following Table :—

Stations.		Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000 of Strength.	
					Admitted.	Died.
Sea Coast .	Fort St. George and St. Thomas's Mount	1,230	2,235	35	1,817	28·45
	Cannanore	616	1,046	9	1,698	14·61
	Waltair	136	327	4	2,404	29·41
	Calicut	82	60	..	732	..
	Palavcram.	48	20	1	417	20·83
Plains ..	Trichinopoly	271	475	7	1,753	25·83
	Malleapooram	133	170	4	1,278	30·07
Table Lands	Bangalore	1,946	2,340	24	1,202	12·33
	Bellary	1,189	2,180	32	1,833	26·91
	Secunderabad	2,681	4,152	30	1,549	11·19
	Kamptee	1,233	2,304	34	1,869	27·57
	Seetabuldee	55	131	1	2,382	18·18
Hill Station ..	Wellington	607	990	8	1,631	13·18
Birmah .	Rangoon	869	952	18	1,095	20·71
	Tonghoo	494	585	11	1,184	22·27
	Thayetmyo	615	944	12	1,535	19·51
Singapore	Singapore	143	257	1	1,797	6·99
	Penang	38	43	1	1,132	26·32
Depôts..	Poonamallee	163	453	17	2,779	104·30
	Chindwarrah	60	241	3	4,017	50·00
	Ramandroog	39	56	2	1,436	51·28
Deaths among the Troops on the March, or detached from their Corps ..		..	..	12	..	..

Of the larger stations Rangoon, Tonghoo, and Bangalore have been those at which the admissions into hospital, and Secunderabad, Bangalore, Wellington, and Cannanore those at which the mortality has been lowest. The very high ratio of admissions and deaths at Poonamallee, Chindwarrah, and Ramandroog is due to the circumstance of the first being the general depôt and the others convalescent depôts to which invalids are sent for change of air and the benefit of a hill climate.

The influence of the different classes of diseases in producing the sickness and mortality at each of the groups of the stations is shown in the following Table :—

Orders.	Diseases.	Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Stations.		Birmah.		Singapore.		Depôts.		Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Stations.		Birmah.		Singapore.		Depôts.	
	Average Strength	2,112		404		7,104		607		1,978		181		262		Annual Ratio per 1,000 of Strength.													
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																												
1	Miasmatic Diseases., ...	1070	27	160	3	4564	54	280	2	843	22	93	...	359	7	506·6	12·79	396·3	7·43	642·5	7·60	461·3	3·30	426·2	11·12	513·8	...	1370·4	26·71
2	Enthetic ,, ...	666	3	136	...	1971	...	134	1	447	1	40	...	130	1	315·4	1·42	336·6	...	277·5	...	220·7	1·70	226·0	·51	221·0	...	496·2	3·82
3	Dietic ,, ...	44	...	10	...	160	1	4	...	29	...	2	...	16	1	20·8	...	24·7	...	22·5	·14	6·6	...	14·7	...	11·1	...	61·1	3·82
4	Parasitic ,, ...	61	...	12	...	144	...	13	...	9	...	...	...	3	...	28·9	...	29·7	...	20·3	...	21·4	...	4·6	...	...	...	11·4	...
	Class II.																												
1	Diathetic ,, ...	15	...	1	...	65	2	1	...	5	...	...	...	5	...	7·1	...	2·5	...	9·1	·28	1·7	...	2·5	...	...	...	19·1	...
2	Tubercular ,, ...	59	1	5	...	80	4	12	...	23	2	2	...	33	7	27·9	·47	12·3	...	11·3	·56	19·8	...	11·6	·101	11·1	...	125·9	26·71
	Class III. Diseases of the—																												
1	Nervous System ...	124	6	14	...	243	4	52	...	98	3	8	...	30	1	58·7	2·84	34·6	...	34·2	·56	85·7	...	49·5	1·51	44·2	...	114·5	3·82
2	Circulatory ,, ...	46	2	9	1	83	8	24	1	30	...	1	...	11	1	21·8	·95	22·2	2·47	11·7	1·13	39·5	1·70	15·2	...	5·5	...	42·0	3·82
3	Respiratory ,, ...	152	1	20	1	418	2	55	1	74	...	13	...	26	...	72·4	·47	49·5	2·47	58·8	·28	90·6	1·70	37·4	...	71·8	...	99·2	...
4	Digestive ,, ...	404	7	62	3	1111	23	93	3	255	6	24	...	65	4	191·3	3·32	153·4	7·43	156·4	3·24	153·2	4·94	128·9	3·03	132·6	...	248·1	15·26
5	Urinary ,, ...	19	1	3	...	16	...	2	...	4	1	1	1	4	...	9·0	·47	7·4	...	2·3	...	3·3	...	2·0	·51	5·5	5·53	15·3	...
6	Reproductive ,, ...	70	...	18	...	132	...	15	...	19	...	8	...	8	...	33·1	...	44·5	...	18·6	...	24·7	...	9·6	...	44·2	...	30·5	...
7	Locomotive ,, ...	18	...	1	...	42	...	11	...	9	...	...	...	4	...	8·5	...	2·5	...	5·9	...	13·1	...	4·6	...	...	...	15·3	...
8	Integumentary,, ...	522	...	106	...	1029	...	86	...	384	...	69	...	32	...	247·2	...	262·9	...	144·9	...	141·7	...	194·1	...	381·2	...	122·1	...
	Class IV.																												
4	Diseases of Nutrition ...	25	...	10	1	25	...	13	...	9	...	6	1	3	...	11·8	...	24·7	2·47	3·5	...	21·4	...	4·6	...	33·2	5·53	11·4	...
	Class V.																												
1	Accidents	364	1	72	1	967	21	191	...	235	5	32	...	21	1	172·4	·47	178·2	2·47	136·1	2·96	314·7	...	118·8	2·53	176·8	...	80·1	3·82
3	Homicide	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	Suicide	...	...	...	...	...	1	...	...	1	1	...	...	...	...	...	...	...	...	...	·14	...	...	·5	·51	...	...	...	...
6	Corporal Punishment ...	28	...	6	...	18	...	3	...	6	...	1	...	...	...	13·3	...	14·8	...	2·5	...	4·9	...	3·0	...	5·5	...	...	...
	Diseases not specified ...	...	...	...	...	38	...	...	...	1	...	...	...	...	...	...	...	...	...	5·3	...	...	...	·5	...	...	...	...	...
	No appreciable disease ...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	·1	...	1·7	...	...	...	...	...	...	...
	Total	3688	49	645	10	11107	120	990	8	2481	41	300	2	750	23	1746·2	23·20	1596·5	24·74	1563·5	16·89	1631·0	13·34	1254·3	20·73	1657·5	11·06	2862·6	87·78

Madras. The admissions have been higher than in 1863 at all the groups of stations, and the mortality except at the Hill Stations, Birmah, Singapore, and the Depôts. The difference in the deaths has been chiefly in those by miasmatic diseases.

MIASMATIC DISEASES have been more prevalent than in 1863 at the stations on the sea coast and table lands and in Birmah, but less prevalent in the other groups; when subdivided they give the following results:—

Madras.

Diseases.	Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Stations.		Birmah.		Singapore.		Poonamallee, Ramandroog, and Chindwarrah.		Stations on Sea Coast.		Stations on Plains.		Stations on Table Lands.		Hill Stations.		Birmah.		Singapore.		Poonamallee, Ramandroog, and Chindwarrah.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	6	1	...	...	7	1	...	...	...	...	...	...	...	...	2·8	·47	...	...	1·0	·14	...	...	...	...	...	...	...	...
Paroxysmal ,, ...	105	4	42	...	1507	6	101	1	192	3	16	...	152	...	49·7	1·89	103·9	...	212·1	·84	166·4	1·70	97·1	1·51	88·4	...	580·1	...
Continued ,, ...	103	2	...	...	533	16	2	...	111	7	8	...	17	1	48·8	·95	...	...	75·0	2·25	3·3	...	56·1	3·54	44·2	...	64·9	3·82
Dysentery and Diarrhœa ...	433	14	56	2	1319	8	70	1	342	8	45	...	80	3	205·0	6·63	138·6	4·95	185·7	1·12	115·3	1·70	172·9	4·04	248·6	...	305·3	11·45
Spasmodic Cholera	8	6	1	1	43	24	...	...	7	4	...	...	9	1	3·8	2·84	2·5	2·47	6·0	3·87	...	...	3·5	2·02	...	...	34·3	3·82
Sorethroat and Influenza ...	56	...	14	...	144	...	35	...	29	...	6	...	4	...	26·5	...	34·6	...	20·3	...	57·7	...	14·7	...	33·1	...	15·3	...
Ophthalmia	65	...	8	...	490	...	14	...	45	...	9	...	30	...	30·8	...	19·8	...	69·1	...	23·1	...	22·7	...	49·7	...	114·5	...
Rheumatism	199	...	34	...	411	...	48	...	93	...	5	...	60	...	94·2	...	84·2	...	57·8	...	79·1	...	47·0	...	27·6	...	229·0	...

Madras. *Eruptive Fevers* have not been prevalent at any of the stations.

Paroxysmal Fevers have been above the amount in 1863 at all the groups, except the stations on the sea coast and Singapore. At the former there has been a very marked reduction. Kamptee was the station at which the greatest number of admissions by these fevers occurred, and next to it was Secunderabad.

Dysentery and Diarrhœa have also been much higher than in the preceding year at all the groups, except the Depôts, and the mortality has been much in excess, except in Birmah and Singapore, and the stations on the Table Lands. Secunderabad, Bellary, Cannanore, and Bangalore were the stations which furnished the largest number of cases.

Spasmodic Cholera.—As already stated, there were 68 admissions and 36 deaths by this disease throughout the Command. The details respecting them will be found at page 127. Those deaths which occurred on the march, amounting to 18, have in the Table been included in the mortality of the station to which the troops were proceeding. The other 18 deaths were distributed as follows :—7 at Madras, 1 at St. Thomas's Mount, 5 at Kamptee, 2 at Secunderabad, and 1 at Bangalore, Trichinopoly, and in Birmah.

Ophthalmia.—The stations on the table lands and Singapore were the only groups in which this disease prevailed to a great extent. At the former, the excess was caused by the epidemic in the 21st Regiment at Bangalore ; at the latter, the comparatively high rate appears to be an irregularity dependent on the small number of men under observation.

Enthetic Diseases.—The admissions by venereal diseases have been in excess of the amount in 1863 at all the groups, except the stations on the plains.

Diseases of the Integumentary System have been much more prevalent at all the groups of stations, except the Depôts, but particularly at those on the sea coast and plains. Boils (*phlegmon*) and ulcers have been the chief forms of disease.

Corporal Punishment.—The ratio of admissions under this head was very high at the stations on the sea coast and plains. At the former the excess occurred chiefly in the 102nd Regiment at Cannanore ; at the latter group it has been apparently an irregularity due to small numbers under observation.

The following Table shows the amount of sickness and mortality in each corps during the year :—

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
ARTILLERY.								
D Brigade, R. H. A.	620	1,285	18	1	19	2072·6	30·64	A Battery, Bangalore .. / B „ Secunderabad / C „ Kamptee / D „ Bellary .. } 12 months.
14th Brigade, R. A.	473	649	16	2	18	1372·1	38·05	A Battery, Bangalore, 12 months. / B „ Trimulgherry, 10 months, in camp, 2 months. / C „ Kamptee, 12 months.
17th Brigade, R. A.	337	593	8	..	8	1759·6	23·74	No. 1 Battery, St. Thomas's Mount, 12 months. / No. 2 „ Singapore, 6 months, Penang, 6 months. / No. 3 „ Kamptee, 12 months. / No. 4 „ Singapore, 12 months. / No. 5 „ Secunderabad, 11⅔ months, on march ⅓ month. / No. 6 „ Singapore, 12 months.
20th Brigade, R. A.	723	1,534	19	1	20	2121·7	27·66	A Battery, Rangoon .. / B „ Waltair .. / C „ Trichinopoly / D „ Kamptee .. / E „ Tonghoo .. / F „ Cannanore .. } 12 months.
23rd Brigade, R. A.	938	1,887	21	2	23	2011·7	24·52	A Battery, Bangalore, 12 months. / B „ Secunderabad, 12 months. / C & F „ St. Thomas's Mount, 12 months. / D „ On march, ⅔ month, Trimulgherry, 11⅓ months. / E „ Bellary, 12 months. / G „ Thayetmyo, 12 months.
Total Royal Artillery ..	3,091	5,948	82	6	88	1924·3	28·47	

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
CAVALRY.								
1st Dragoon Guards	539	498	6	1	7	923·9	12·99	Bangalore, 10½ months; on march, 1½ month.
17th Lancers	514	666	9	1	10	1295·7	19·45	Secunderabad, 11½ months; on march, ½ month.
18th Hussars	154	294	2	..	2	1909·1	12·99	Arrived from England, 21st September; Bangalore, 3½ months.
Total Cavalry	1,207	1,458	17	2	19	1208·0	15·74	
INFANTRY.								
1st Foot, 1st Battalion	897	1,595	21	11	32	1778·2	35·67	Kamptee, 12 months; detachment at Seetabuldee.
18th „ 1st „	921	1,519	11	6	17	1649·3	18·46	Trimulgherry, 12 months.
19th „ 2nd „	876	1,210	27	..	27	1381·3	30·82	Thayetmyo, 12 months; right wing Tonghoo, 11 months; on march, 1 month.
21st „ 2nd „	975	1,600	17	..	17	1641·0	17·44	Bellary, 12 months.
60th „ 3rd „	868	941	20	2	22	1084·1	25·35	Rangoon, 12 months; detachment at Port Blair, 1 month.
66th „	921	1,027	17	3	20	1115·1	21·72	Bangalore, 12 months.
74th „	86	135	9	..	9	1569·8	104·06	On the march, &c., 2 months; embarked for England.
76th „	779	1,346	17	..	17	1727·9	21·82	At sea, 1 month; Fort St. George, 11 months.
102nd „	752	1,234	12	3	15	1641·0	19·95	Cannanore, 12 months.
105th „	708	1,164	11	3	14	1644·1	19·77	Head-Quarters Wellington, 12 months; detachments at Madras, Poonamalee, Trichinopoly, and Trimulgherry.
108th „	527	723	5	..	5	1371·9	9·49	Trimulgherry, 12 months.
Total Infantry	8,310	12,494	167	28	195	1503·5	23·47	

The sickness and mortality have been highest in the Artillery, and lowest in the Cavalry. The 1st Dragoon Guards at Bangalore had the lowest ratio of admissions, and the same corps and 18th Hussars the lowest ratio of deaths; but the latter was in India only for about three months. Of the Infantry regiments the 3rd Battalion 60th, at Rangoon, had the lowest ratio of admissions, and the 108th at Trimulgherry of deaths. The very high proportion of deaths in the 74th is merely an irregularity arising from the short time the corps was under observation and the outbreak of cholera in it while on the march to the port of embarkation. The high proportion of deaths in the 1st Foot was caused by the number which occurred among the invalids, seven of which were by cholera. *Madras.*

III. Bombay.

The average strength of the troops in this Command during the year was 12,173, the admissions into hospital were 17,438, and the deaths 225, including 21 among invalids sent to England. These numbers give the proportion of 1,432 admissions, and 18·48 deaths per 1,000 of the strength, the former being 150 below, and the latter $2\frac{1}{3}$ above the amount in 1863. *Bombay.*

The diseases by which the sickness and mortality were caused are stated in Abstract No. XXVIII of Appendix, from which the following classified summary has been prepared:—

Bombay.

Order.	Diseases.	1864. Strength, 12,173. Admissions.	Deaths. In India.	Deaths. Of Invalids.	Deaths. Total.	1864. Ratio per 1,000. Admitted.	1864. Ratio per 1,000. Died.	1860–63. Ratio per 1,000. Admitted.	1860–63. Ratio per 1,000. Died.
	Class I.								
1	Miasmatic Diseases ..	8,237	81	10	91	676·7	7·48	992·9	12·80
2	Enthetic „ ..	2,966	2	3	5	243·7	·41	302·1	·27
3	Dietic „ ..	302	1	..	1	24·8	·08	19·6	·20
4	Parasitic „ ..	141	..	..	..	11·6	..	11·6	..
	Class II.								
1	Diathetic Diseases ..	146	4	..	4	12·0	·33	8·1	·20
2	Tubercular „ ..	112	17	7	24	9·2	1·97	9·0	1·60
	Class III. Diseases of the—								
1	Nervous System ..	436	15	..	15	35·8	1·23	32·8	1·39
2	Circulatory „ ..	205	18	..	18	16·8	1·48	12·6	·59
3	Respiratory „ ..	638	4	1	5	52·4	·41	49·5	1·01
4	Digestive „ ..	1,466	36	..	36	120·4	2·96	119·3	3·71
5	Urinary „ ..	31	..	..	..	2·5	..	2·7	·07
6	Reproductive „ ..	184	..	..	..	15·1	..	9·8	..
7	Locomotive „ ..	73	..	..	..	6·0	..	4·9	..
8	Integumentary „ ..	1,126	3	..	3	92·5	·25	101·2	·07
	Class IV.								
4	Diseases of Nutrition.	33	1	..	1	2·7	·08	4·6	·14
	Class V.								
1	Accidents	1,323	15	..	15	108·7	1·23	90·6	1·51
3	Homicide	2	1	..	1	·2	·08	..	·02
4	Suicide	1	6	..	6	·1	·49	·1	·34
5	Execution	..	..	..	..	..	..	..	·02
6	Corporal Punishment	16	..	..	..	1·3	..	1·2	..
	Diseases not specified	..	..	..	..	..	..	1·5	·16
	Total	17,438	204	21	225	1432·5	18·48	1774·1	24·10

The admissions have been considerably under the average of the four preceding years, the decrease being chiefly in miasmatic and venereal diseases. The deaths also show a marked diminution, which has taken place principally in miasmatic diseases and those of the digestive system.

Miasmatic Diseases, when subdivided into groups, give the following results :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1864. Admitted.	1864. Died.	1860-63. Admitted.	1860-63. Died.
Eruptive Fevers..	46	4	3·8	·33	1·7	·25
Paroxysmal ,, ...	4,637	16	380·9	1·32	572·3	1·89
Continued ,, ...	541	11	44·4	·99	119·8	1·35
Dysentery and Diarrhœa	1,287	24	105·7	1·97	141·3	3·93
Spasmodic Cholera..	37	25	3·0	2·05	7·2	4·57
Sorethroat and Influenza	249	..	20·5	..	20·4	·02
Ophthalmia..	478	..	39·3	..	57·8	..
Rheumatism.	826	..	67·8	·08	64·5	..

Eruptive Fevers have exceeded the previous average from the occurrence of a considerable number of cases of small-pox at Mhow and Poona, where the disease prevailed as an epidemic among the civil population. Forty-two cases are returned, of which four died; all are reported to have borne marks of vaccination.

Paroxysmal Fevers, although much under the previous average, were still a source of great inefficiency. One-fifth of the whole admissions by the group, however, occurred in the 103rd Regiment.

Spasmodic Cholera did not prevail to any great extent among the British troops, although it was epidemic among the native population at several of the stations. The only station where it can be said to have assumed the form of an epidemic among the troops was Mhow, where 18 cases occurred, with 12 deaths. [redacted]t on the 2nd of May, and between that date and the 1st of J[redacted] the last death occurred, the 6th Dragoons lost one man, the Roy[redacted]rtillery six, and the 72nd Regiment five men. Great benefit appeared to result from encamping.

Ophthalmia was considerably under the average of the four preceding years. In the 4th Regiment it gave rise to less than half the number of admissions from the same cause in 1863, and the surgeon attributes the improvement to the issue of a separate washhand-basin to each man.

Enthetic Diseases have been a source of considerably less inefficiency than previously; but no reason has been assigned for the decrease.

The other classes of diseases differ little from the average of previous years, and do not seem to require special remark.

The sickness and mortality in each of the military divisions of the Bombay Command, are shown in the following Table:—

Bombay.

Military Divisions.	Stations.	Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.
Presidency	Colaba	504	1,082	8	2,146·8	15·91
	Khandalla (General Depôt)	106	139	6	1,314·4	56·61
Poona ..	Poona..	1,850	1,779	20	961·6	10·81
	Sattara.	136	157	1	1,077·4	7·35
	Ahmednuggur ..	537	744	3	1,385·5	5·59
	Asseerghur . ..	133	268	4	2,015·1	30·08
	Belgaum	1,064	1,219	16	1,145·7	15·04
	Kirkee	661	1,036	8	1,567·2	12·10
	Sholapoor	98	149	1	1,520·4	10·20
Mhow ..	Mhow	1,440	2,604	31	1,808·3	21·53
	Indore	108	244	2	2,264·5	18·52
	Neemuch	545	1,484	9	2,723·9	16·51
	Nusseerabad ..	760	1,672	19	2,200·0	25·00
	Ajmere.	59	91	1	1,542·4	16·95
Northern..	Deesa..	931	1,116	9	1,198·7	9·67
	Ahmedabad. ..	157	266	3	1,694·3	19·11
	Mount Aboo ..	39	88	1	2,256·4	25·64
	Baroda.	123	355	3	2,886·2	34·39
Scinde ..	Kurrachee.. ..	1,069	1,289	12	1,205·8	11·23
	Hydrabad	575	675	4	1,173·9	6·96
	Aden	554	581	5	1,048·8	9·03
	Sanitaria & Invalids. ..	479	1,040*	32	2,171·2	66·81
	On the March ..	483	667	6	1,380·9	12·42

The sickness has been considerably above the average at all the stations in the Mhow Division. It has also been in excess at Mount Aboo and Baroda in the Northern, and [illegible] Division [illegible] tions at which the mortality [illegible] Colaba in the Presidency Division [illegible] ral depôt and sanit[illegible] has been much above the average, omitti[illegible] bad.

The [illegible]aria, have been Baroda, Asseerghur, Mount Aboo, and [illegible] influence of the different classes of diseases in causing sickness and [illegible]ortality in each of the military divisions, is shown in the following Table :—

* Chiefly re-admissions already accounted for as admissions at other stations.

Order.	Military Divisions ...	Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on March.		Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on March.	
	Average Annual Strength	610.		4,479.		2,912.		1,250.		1,644.		554.		483.		Annual Ratio per 1,000 of Strength.													
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	Class I.																												
1	Miasmatic Diseases ...	700	6	1847	16	3372	31	1002	9	801	4	231	...	334	3	1147·6	9·84	412·4	3·57	1158·0	10·64	801·6	7·20	487·2	2·43	417·0	...	691·5	6·21
2	Enthetic ,, ...	164	...	1317	...	779	1	300	...	317	...	92	...	97	...	268·8	...	294·0	...	267·5	·34	240·0	...	193·3	...	166·1	...	200·8	...
3	Dietic ,, ...	21	...	89	1	116	...	36	...	43	...	8	...	5	...	35·2	...	19·9	·22	39·9	...	28·7	...	26·1	...	14·4	...	10·3	...
4	Parasitic ,, ...	4	...	61	...	33	...	13	...	19	...	2	...	2	...	6·5	...	13·6	...	11·3	...	10·4	...	11·6	...	8·6	...	4·1	...
	Class II.																												
1	Diathetic Diseases ...	10	...	48	...	38	1	9	...	21	...	22	...	4	...	16·3	...	10·7	...	13·1	·34	7·2	...	12·8	...	39·7	...	8·3	...
2	Tubercular ,, ...	7	...	34	4	17	2	13	1	27	1	3	2	3	1	11·4	...	7·6	·89	5·8	·68	10·4	·80	16·4	·61	5·4	3·61	6·2	2·07
	Class III.																												
	Diseases of the—																												
1	Nervous System ...	35	2	153	4	129	5	33	...	44	1	28	...	12	...	57·3	3·28	34·1	·89	44·3	1·72	26·4	...	26·7	·61	50·5	...	24·9	...
2	Circulatory ,, ...	5	...	61	4	55	5	4	2	48	4	4	1	4	...	8·2	...	13·6	·89	18·9	1·72	3·2	1·60	29·2	2·43	7·2	1·81	8·3	...
3	Respiratory ,, ...	25	...	213	2	246	2	30	...	72	...	30	...	35	...	40·9	1·64	47·6	·45	84·3	·68	24·0	...	43·8	...	54·2	...	72·5	...
4	Digestive ,, ...	62	4	494	10	486	11	149	2	197	...	45	1	39	2	101·6	6·56	110·3	2·23	166·9	3·78	119·2	1·60	119·3	...	81·3	1·81	80·8	4·14
5	Urinary ,, ...	2	...	7	...	14	...	6	...	1	...	1	...	2	...	3·2	...	1·6	...	4·8	...	4·8	...	·6	...	1·8	...	4·2	...
6	Reproductive ,, ...	21	...	81	...	42	...	18	...	21	...	2	...	10	...	34·4	...	18·0	...	14·4	...	14·4	...	12·7	...	3·6	...	20·7	...
7	Locomotive ,, ...	4	...	31	...	25	...	...	...	9	...	1	...	6	...	6·5	...	6·9	...	8·6	...	...	...	5·4	...	1·8	...	12·4	...
8	Integumentary ,, ...	99	...	380	2	342	...	86	...	135	...	57	...	55	...	162·2	...	84·9	·45	117·5	...	68·8	...	82·1	...	102·9	...	113·9	...
	Class IV.																												
4	Diseases of Nutrition ...	2	1	10	...	18	...	...	...	6	1	...	...	2	...	3·3	1·64	2·2	...	6·1	...	...	...	3·6	·61	...	...	4·1	...
	Class V.																												
1	Accidents	60	...	518	9	375	4	122	1	200	2	55	1	57	...	98·4	...	115·7	2·01	128·8	1·38	97·6	·80	121·6	1·21	99·2	1·81	118·0	...
3	Homicide	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	1·2	...	...	...	...	...
4	Suicide	...	...	...	1	...	...	1	1	...	3	...	...	...	...	...	...	...	·22	...	...	·8	·80	...	1·84	...	...	...	...
6	Corporal Punishment ...	...	...	8	...	6	...	3	...	1	...	...	...	...	...	...	...	1·8	...	2·1	...	2·4	...	·6	...	...	...	...	...
	No appreciable disease ...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	·7	...	...	...	...	...	...	...	...	...
	Total...	1221	14	5352	53	6095	62	1825	16	1964	16	581	5	667	6	2001·8	22·96	1194·9	11·82	2093·0	21·28	1459·9	12·80	1194·7	9·74	1048·7	9·04	1381·0	12·42

Bombay. The admissions into hospital have been much higher than in 1863 in the Presidency Division, the increase being chiefly in miasmatic and venereal diseases; but they have been considerably lower than in that year in all the other divisions. The ratio of deaths in the Mhow Division was much higher than in 1863, chiefly from the outbreak of cholera; while among the troops on the march it was less than one-third of the proportion in that year. The other divisions did not show any marked difference from the previous results.

MIASMATIC DISEASES, when subdivided, give the following results:—

Military Divisions	Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on the March.		Presidency.		Poona.		Mhow.		Northern.		Scinde.		Aden.		Troops on the March.	
Average Annual Strength	610		4,479		2,912		1,250		1,644		554		483		Annual Ratio per 1,000 of Mean Strength.													
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Eruptive Fevers	...	...	18	2	12	2	7	...	7	...	...	...	1	...	...	...	4·02	·45	4·12	·68	5·60	...	4·26	...	...	...	2·07	...
Paroxysmal	446	...	873	3	2204	11	574	1	404	1	11	...	150	...	731·15	...	194·91	·67	756·88	3·78	459·20	·80	245·74	·61	19·86	...	310·56	...
Continued	24	1	62	...	165	1	166	7	38	1	67	...	25	1	39·35	1·64	13·84	...	56·66	·34	132·80	5·60	23·12	·61	120·94	...	51·76	2·07
Dysentery and Diarrhœa	97	4	361	6	465	4	97	1	147	...	45	...	66	...	159·01	6·55	80·59	1·35	159·70	1·38	77·60	·80	89·42	...	81·23	...	136·65	...
Spasmodic Cholera	1	1	10	5	21	13	1	...	...	...	...	...	2	2	1·64	1·64	2·24	1·12	7·20	4·46	·80	...	...	...	...	...	4·14	4·14
Sorethroat and Influenza	6	...	59	...	132	...	27	...	17	...	...	...	20	...	9·84	...	13·17	...	45·33	...	21·60	...	10·34	...	...	...	41·40	...
Ophthalmia	23	...	143	...	71	...	64	...	83	...	89	...	3	...	37·70	...	31·93	...	24·38	...	51·20	...	50·49	...	160·64	...	6·21	...
Rheumatism	90	...	289	...	258	...	51	...	79	1	18	...	45	...	147·54	...	64·52	...	88·60	...	40·80	...	48·06	·61	32·49	...	93·17	...

Bombay. *Eruptive Fevers* were more than usually prevalent in all the divisions except the Presidency and Aden, but did not give rise to a high rate of mortality. At Poona sixteeen, and at Mhow eleven cases of small-pox occurred; two at each proving fatal. Five cases were admitted at Kurrachee, and four at Deesa, all of which recovered. None of the other diseases in this group prevailed epidemically.

Paroxysmal Fevers were greatly in excess in the Presidency Division, owing to the prevalence of intermittent fever at Colaba in the 28th Regiment. The liability of the men to this form of fever does not seem to have been due to the climate of Colaba, but to their previous service for nearly four years at Nusseerabad, from which station the head-quarters arrived at Colaba on the 11th of January. The very great prevalence of intermittent fever in the corps was noticed in the Report for 1863. In all the other divisions there has been a reduction in the prevalence of this form of fever. The stations of Neemuch, Nusseerabad, Mhow, and Poona continue, however, still to furnish a large number of cases.

Dysentery and Diarrhœa have been more prevalent than in 1863 in the Presidency and Mhow Divisions, and considerably under the previous amount in the Northern Division. The excess in the Presidency seems due to the same cause as the increase in fevers—the previous service of the 28th Regiment; and in the Mhow Division, to the prevalence of cholera as an epidemic, an event invariably attended with an increase of bowel complaints.

Spasmodic Cholera.—We have already noticed the outbreak of this disease at Mhow. The only other station at which any number of cases occurred was Poona. In May two were admitted and one died in the 4th Regiment, and in July there were five cases and one death in the 33rd Regiment, but no particulars are given of them in the reports.

Ophthalmia has been less prevalent in all the divisions than in 1863, but was still a source of considerable inefficiency at Aden, where it was confined to the right wing of the 95th Regiment. The admissions were numerous also in the left wing at Hydrabad, the A Battery 18th Brigade, Royal Artillery, and the 1st Battalion 4th Foot, at Poona, and in the F Battery 14th Brigade, Royal Artillery, at Deesa.

Enthetic Diseases.—The admissions by venereal diseases have been considerably more numerous in the Presidency Division, and less numerous at Aden than in 1863. There has been no very marked difference in the other divisions.

Diseases of the Digestive System have been very prevalent and fatal in the Mhow Division, the prominent diseases being dyspepsia, colic, and inflammation of the liver. Mhow and Nusseerabad furnished also a comparatively large number of cases of spleen disease.

The admissions and deaths in the different corps were as follows:—

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
ARTILLERY.								
E Brigade, R.H.A.	595	1,463	17	1	18	2,458·8	30·25	A Battery, Nusseerabad B „ Kirkee .. C „ Mhow .. } 12 months. D „ Kirkee, 2 months; Ahmednuggur, 8½ months; Mhow, 1½ month.
14th Brigade, R.A.	503	723	10	..	10	1,437·4	19·88	D Battery, Kirkee .. E „ Ahmedabad F „ Deesa .. } 12 months.
18th Brigade, R.A.	1,023	1,737	17	3	20	1,697·9	19·60	A Battery, Hydrabad, 11½ months; Kurrachee, ½ month. B „ Kirkee, 1 month; Sholapoor, 9 months; on the march, 2 months. C „ Kurrachee, 11 months; Hydrabad, 1 month. D „ Neemuch E „ Belgaum F „ Kirkee .. } 12 months. G „ On the march, 1⅔ month; Baroda, 11⅓ months.
21st Brigade, R.A.	619	858	15	3	18	1,386·1	29·08	Nos. 1 and 2 Batteries, Mhow detachment at Indore, 12 months. No. 3 Battery, Belgaum, 10 months; Aden, 2 months. No. 4 „ Kirkee, 5½ months; Poona, 6½ months. No. 5 „ Aden.. No. 6 „ Kirkee No. 7 „ Aden.. } 12 months.
Sappers	42	75	2	..	2	1,785·8	47·62	Poona.
Total Ordnance Corps ..	2,782	4,856	61	7	68	1,745·5	25·01	

Regiments.	Average Annual Strength.	Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Stations during the Year.
			In India.	Of Invalids.	Total.	Admitted.	Died.	
CAVALRY.								
3rd Dragoon Guards..	470	564	5	..	5	1,200·0	10·64	Ahmednuggur, 12 months.
6th Dragoons..	492	1,016	14	2	16	2,065·0	32·52	Mhow, 12 months.
Total Cavalry	962	1,580	19	2	21	1,642·4	21·83	
INFANTRY.								
4th Foot, 1st Battalion	886	693	9	1	10	782·2	11·29	Poona, 12 months.
28th Foot	765	1,475	10	2	12	1,928·2	15·69	On march, ½ month; Colaba, 9½; detachment at Nusseerabad, Asseerghur, and Sattara; embarked for England.
33rd Foot	905	853	14	..	14	942·6	15·47	Poona, 12 months.
44th „	915	957	18	..	18	1,045·9	19·67	Belgaum, 12 months.
45th „	113	280	..	..	..	2,477·9	..	Arrived from England 15th November; Colaba, 1½ months.
56th „	846	953	10	2	12	1,126·6	14·19	Deesa; detachment Mount Aboo, 12 months.
72nd „	882	1,328	14	..	14	1,505·7	15·87	Mhow; detachment Indore, 12 months.
95th „	949	930	6	1	7	980·0	7·38	Head-quarters, Hydrabad, 11 months; Kurrachee, 1 month; right wing, Aden, 11 months; Kurrachee, 1 month.
103rd Foot	944	1,769	20	3	23	1,874·0	24·37	Head-quarters, Neemuch, 12 months; left-wing Nusserabad, 9 months, Bombay, ⅓ month, on march ⅔ month.
106th Foot	438	741	14	2	16	1,691·8	36·53	On march, 1 month; Nusseerabad, 11 months.
109th „	825	1,023	9	1	10	1,240·0	12·12	Kurrachee, 11 months; Head-Quarters Aden; detachment Hydrabad, 1 month.
Total Infantry	8,468	11,002	124	12	136	1,299·3	16·10	

This Table shows the same general result as in the preceding year, the highest ratio of admissions in the Artillery and lowest in the Infantry—and the same is observed with regard to the mortality. Omitting the Sappers on account of the very small number under observation, the highest ratio of deaths occurred in the 106th Regiment at Nusseerabad, and next to it in the 6th Dragoons at Mhow; the latter corps furnished also the highest proportion of admissions into hospital in the Command, except the E Brigade, Royal Horse Artillery. The lowest ratio of admissions was in the 1st Battalion 4th Foot, at Poona, and of deaths in the 95th Regiment at Hydrabad and Aden. *Bombay.*

Section II.

On the Extent of Invaliding.

The returns showing the number of men of the Royal Artillery sent to England as invalids from Bengal during 1864, and the nature of their disabilities are unfortunately not available. It has been necessary, therefore, to calculate the proportion sent home on the strength of those corps only from which returns have been received. *India.*

During the year there were 1,195 invalids sent home from the Force in Bengal, exclusive of the Artillery, 845 from the troops in Madras, and 402 from Bombay, being respectively in the proportion of 34·5, 65, and 33 per 1,000 of the strength. The disabilities for which they were sent to England are stated in Abstract No. XXIX of Appendix, from which the following Table has been prepared:—

India.

Order.		Bengal.	Madras.	Bombay.
	Mean Strength	34,629	12,993	12,173
	Class I.			
1	Miasmatic Diseases—			
	Ophthalmia	66	10	22
	Erysipelas	..	2	..
	Dysentery and Diarrhœa	52	77	22
	Paroxysmal Fevers ..	59	13	15
	Continued „ ..	7	4	..
	Rheumatism	154	114	51
	Parotitis..	..	1	..
2	Enthetic Diseases.. ..	77	95	36
3	Dietic „	..	2	2
4	Parasitic „	1	1	1
	Class II.			
1	Diathetic Diseases ...	34	7	11
2	Tubercular „	140	77	31
	Class III.			
	Diseases of the—			
1	Nervous System ..	83	82	42
2	Circulatory „ ..	86	69	55
3	Respiratory „ ..	47	42	9
4	Digestive „ ..	204	127	70
5	Urinary „ ..	3	4	4
6	Reproductive „ ..	6	19	4
7	Locomotive „ ..	17	9	6
8	Integumentary „ ..	13	19	5
	Class IV.			
4	Diseases of Nutrition ..	117	51	4
	Class V.			
1	Accidents	28	18	12
	Diseases not specified ..	1	2	..
	Total ..	1,195	845	402
	Ratio per 1,000 of mean Strength.. 1864	34·51	65·03	33·02
	Ratio per 1,000 of mean Strength.. 1861-3	30·42	34·60	30·88

There has been a marked increase in the proportion sent home from Madras, and a very trifling increase from the other two Presidences. The increase has not been confined to any special class of disabilities. There has been a decrease in the number of cases of ophthalmia and diseases of nutrition, and accidents have remained nearly as before.

The number of invalids from India finally discharged the service at Netley during the year, was 663 from Bengal, 144 from Madras, and 298 from Bombay. The disabilities assigned as the cause of their discharge are shown in the following Table, prepared from Abstract No. XXIX of Appendix :—

	Discharged at the Invalid Depôt at Netley, Invalids from—		
	Bengal.	Madras.	Bombay.
Mean Strength	39,936	12,993	12,173
Miasmatic Diseases:—			
Paroxysmal Fevers	11	..	3
Erysipelas	1	..	..
Dysentery and Diarrhœa ..	22	5	8
Ophthalmia	57	5	16
Rheumatism	27	3	16
Enthetic Diseases	35	20	29
Dietic „	1	1	..
Diathetic „	20	3	12
Tubercular „	53	19	28
Diseases of the—			
Nervous System	67	14	33
Circulatory „	61	18	38
Respiratory „	12	5	11
Digestive „	90	15	43
Urinary „	1	1	2
Reproductive „	4	2	2
Locomotive „	16	3	9
Integumentary „	12	2	1
Diseases of Nutrition	157	25	32
Accidents and Violence	16	3	15
Total	663	144	298
Ratio per 1,000 of Strength 1864..	16·60	11·08	24·48
„ „ „ 1860–63	12·82	13·24	32·27

The proportion discharged the service has been above the average of the four preceding years in Bengal and Bombay, but below the amount in 1863 in all three Presidencies. Diseases of nutrition, probably the result of repeated attacks of malarious fever or of bowel complaints, have been the chief cause of discharge. Diseases of the digestive organs, of which the most frequent has been inflammation of the liver, rank next in Bengal and Bombay.

Section III.

Mean Daily Sick.

The average number constantly sick was, in Bengal 2,339, in Madras 851, and in Bombay 671. From calculations based on these numbers the following results are obtained:—

	Bengal.		Madras.		Bombay.	
	1864.	1860-63.	1864.	1860-63.	1864.	1860-63.
Ratio per 1,000 constantly Sick ..	58·59	71·48	65·50	61·56	55·12	67·88
	Days.	Days.	Days.	Days.	Days.	Days.
Average Sick Time to each Soldier	21·38	26·09	23·91	22·47	20·12	24·78
Average Duration of Cases ..	13·73	13·76	15·54	17·04	14·04	13·97

This Table shows the mean daily sick to have been much below the previous average in Bengal and Bombay, but a little above it in Madras. The

India. average sick time to each soldier serving has followed the same rule, but there has been a slight increase in the average duration of the cases in Bombay, and a decrease of a day and a-half in Madras. The latter result would lead to the inference that the increase which was shown to have occurred in the admissions in Madras was either in slight cases or in diseases of an acute character running rapidly to a termination.

Section IV.

On the Influence of Age on the Mortality.

The following Table, prepared from Abstract No. XXX of Appendix, shows the mortality at different ages in quinquennial periods among the troops serving in the three Presidencies:—

	Under 20 years.		20–24.		25–29.		30–34.		35–39.		40 and upwards.	
	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.	Strength on 1st January.	Died during Year.
Bengal	673	12	12,817	147	12,562	305	4,394	121	1,725	66	295	16
Madras	385	2	3,938	54	4,349	106	1,729	47	626	33	135	12
Bombay	525	2	3,545	37	4,386	81	1,926	44	939	40	184	9
Total	1,583	16	20,300	238	21,297	502	8,049	212	3,290	139	614	37
Ratio of Deaths per 1,000 of Strength .. }	10·44		11·72		23·57		26·34		42·25		60·26	
Ratio of Deaths per 1,000 of Strength in— Bengal, 1862–3 Madras and Bombay, 1861-3 .. }	5·40		17·55		24·95		32·15		38·25		50·94	

XIII. ON THE HEALTH OF TROOPS ON BOARD SHIP.

Troops on Board Ship.

THE number of troops on board ship during the year, regarding whom returns have been received, was as follows:—

I.	Troops or drafts proceeding on foreign service	11,536
II.	Do. returning from foreign service	8,316
III.	Do. passing by sea from one colony to another, or from one station in a military Command to another	8,195
IV.	Invalids and "time-expired men" returning to England	4,702

I. TROOPS PROCEEDING ON FOREIGN SERVICE.

The number of men stated in the returns to have embarked for foreign service was 11,536. On grouping together the stations to which they were proceeding, as in previous Reports, the following results are obtained. The detailed statement of the diseases which occurred on ship board will be found in Abstract No. XXXI of Appendix.

Troops on Board Ship

Order.	Diseases.	To Cape of Good Hope, Mauritius, Ceylon, India, and China. Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	To Mediterranean, British America & West Indies. Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	To Australasia. Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.
	Stations												
	Number of men Embarked	9,008				1,699				829			
	Average *Annual* Strength..	2,506				116				169			
	Class I.												
1	Miasmatic Diseases ..	413	5	164·8	2·00	6	..	51·7	..	22	1	130·2	5·92
2	Enthetic „ ..	457	..	182·3	..	17	..	146·6	..	47	..	278·1	..
3	Dietic „ ..	12	..	4·8	..	1	..	8·6	..	1	..	5·9	..
4	Parasitic „ ..	15	..	6·0	..	..	..	..	..	3	..	17·8	..
	Class II.												
1	Diathetic Diseases ..	18	..	7·2	..	..	..	..	..	..	..	..	..
2	Tubercular „ ..	11	2	4·4	·80	..	..	..	..	3	..	17·8	..
	Class III. Diseases of the—												
1	Nervous System ..	66	1	26·3	·39	2	..	17·2	..	4	..	23·7	..
2	Circulatory „ ..	9	3	3·6	1·20	..	..	..	..	3	..	17·8	..
3	Respiratory „ ..	132	..	52·7	..	3	..	25·9	..	18	..	106·5	..
4	Digestive „ ..	89	..	35·5	..	1	..	8·6	..	34	..	201·2	..
5	Urinary „ ..	..	..	..	..	..	..	..	..	..	..	..	..
6	Reproductive „ ..	17	..	6·8	..	..	..	..	..	2	..	11·8	..
7	Locomotive „ ..	6	..	2·4	..	..	..	..	..	..	..	..	..
8	Integumentary „ ..	276	..	110·1	..	6	..	51·7	..	8	..	47·3	..
	Class IV.												
4	Diseases of Nutrition ..	9	..	3·6	..	..	..	..	..	1	..	5·9	..
	Class V.												
1	Accidents	191	3	76·2	1·20	5	..	43·1	..	9	1	53·2	5·92
6	Corporal Punishment..	5	..	2·0	..	..	..	..	..	..	..	..	..
	No appreciable disease.	5	..	2·0	..	..	..	..	..	..	..	..	..
	Total	1731	14	690·7	5·59	41	..	353·4	..	155	2	917·2	11·84

Of the six deaths by miasmatic diseases five arose from continued fevers and one from diptheria. They could not be traced in any way to causes existing in the ships to which they occurred. Three of the deaths in the fifth class were by drowning and one by sunstroke.

II. Troops Returning from Foreign Service.

The diseases among the men returning from foreign service are detailed in Abstract No. XXXII of Appendix, from which the following Table has been framed :—

Troops on Board Ship

Order.	Diseases.	From India and Ceylon. Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	From the West Indies and Mediterranean. Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	From British America. Admitted.	Died.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.
	Stations												
	Number of Men Embarked	4,064				1,607				2,645			
	Average *Annual* Strength.	1,123				124				122			
	Class I.												
1	Miasmatic Diseases ..	268	12	238·7	10·69	10	..	80·6	..	6	..	49·1	..
2	Enthetic „ ..	123	1	109·5	·89	13	..	104·8	..	25	..	204·9	..
3	Dietic.. „ ..	6	..	5·3	..	..	..	..	..	..	..	..	..
4	Parasitic „ ..	..	..	..	..	..	..	..	..	..	..	..	..
	Class II.												
1	Diathetic Diseases ..	3	..	2·7	..	..	..	..	..	..	..	..	..
2	Tubercular „ ..	18	5	16·0	4·45	..	..	..	..	3	1	24·6	8·20
	Class III. Diseases of the—												
1	Nervous System ..	10	..	8·9	..	2	..	16·1	..	3	1	24·6	8·20
2	Circulatory „ ..	5	1	4·5	·89	..	..	..	..	..	..	..	..
3	Respiratory „ ..	62	1	55·2	·89	4	1	32·3	8·06	..	..	..	..
4	Digestive „ ..	49	4	43·6	3·56	..	..	..	..	4	..	32·8	..
5	Urinary „ ..	1	..	·9	..	..	..	..	..	..	..	..	..
6	Reproductive „ ..	7	..	6·2	..	..	..	..	..	1	..	8·2	..
8	Integumentary „ ..	101	..	89·9	..	6	..	48·4	..	8	..	65·6	..
	Class IV.												
4	Diseases of Nutrition ..	6	..	5·3	..	..	..	..	..	1	..	8·2	..
	Class V.												
1	Accidents	55	..	49·0	..	2	..	16·1	..	4	1	32·8	8·20
6	Corporal Punishment..	1	..	·9	..	..	..	..	..	..	..	..	..
	No appreciable disease.	2	..	1·8	..	1	..	8·1	..	..	..	..	..
	Total	717	24	638·4	21·37	38	1	306·4	8·06	55	3	450·8	24·60

The high rate of mortality among the troops returning from the East has manifestly arisen from their previous tropical service. Of the twelve deaths by miasmatic diseases two were the result of paroxysmal fevers, seven of dysentery, and three of diarrhœa; while of the four by diseases of the digestive system three were caused by chronic inflammation of the liver. Of the three deaths on the voyage from British America, and which all occurred among troops returning to England from Bermuda, one was by apoplexy, one by sunstroke two days after embarkation, and the third was an old-standing case of consumption.

III. Troops Proceeding from one Colony or Station to another.

The principal movements of white troops, in addition to the ordinary change of stations within the limits of the various Commands, have been from the Mediterranean to British America, to the West Indies, and to China, and from

the Cape of Good Hope to India; and of black troops between the West Indies and West Coast of Africa. The sickness and mortality while on board ship are detailed in Abstract No. XXXIII of Appendix, of which the following is a summary:— *Troops on Board Ship.*

Order.	Stations / Diseases.	White Troops. Admitted.	White Troops. Died.	White Troops. Ratio per 1,000. Admitted.	White Troops. Ratio per 1,000. Died.	Black Troops. Admitted.	Black Troops. Died.	Black Troops. Ratio per 1,000. Admitted.	Black Troops. Ratio per 1,000. Died.
	Number of Men embarked	7,137				1,058			
	Average *Annual* Strength	602				122			
	Class I.								
1	Miasmatic Diseases	229	4	380·4	6·64	22	1	180·3	8·20
2	Enthetic „	52	..	86·4	..	17	..	139·3	..
3	Dietic „	1	..	1·7	..	..	..	..	..
4	Parasitic „	..	..	..	..	2	..	16·4	..
	Class II.								
1	Diathetic Diseases	..	..	..	..	1	..	8·2	..
2	Tubercular „	12	..	19·9	..	..	..	..	..
	Class III. Diseases of the—								
1	Nervous System	3	..	5·0	..	..	..	..	..
2	Circulatory „	..	..	..	..	1	..	8·2	..
3	Respiratory „	15	1	24·9	1·66	51	6	418·1	49·18
4	Digestive „	11	..	18·3	..	2	..	16·4	..
5	Urinary „	..	..	..	..	..	..	..	..
6	Reproductive „	..	..	..	..	..	..	..	..
7	Locomotive „	..	..	..	..	..	..	..	..
8	Integumentary „	58	..	96·3	..	10	..	81·9	..
	Class IV.								
4	Diseases of Nutrition	2	..	3·3	..	..	..	..	..
	Class V.								
1	Accidents	39	..	64·8	..	4	..	32·8	..
6	Corporal Punishment	2	..	3·3	..	..	..	..	..
	No appreciable disease.	1	..	1·7	..	..	..	..	..
	Total	425	5	706·0	8·30	110	7	901·6	57·38

Three of the deaths in the class of miasmatic diseases among the white troops were by cholera, on the passage from China to Japan. The sickness and mortality among the black troops were chiefly caused by diseases of the respiratory system. These are stated to have been induced by exposure of the men to the inclemency of the weather during the voyage from Jamaica to Cape Coast Castle.

IV. Invalids, &c., Returning to England.

Troops on Board Ship. For reasons explained in former Reports it has been found impossible to separate entirely the "time expired men" from the invalids. A few of the former, therefore, are included under this group. The total number of men comprised in the returns has been 4,702, of whom 1,886 embarked sick; 968 cases and 146 deaths occurred while they were on board ship. As the deaths have been already included in the mortality of the different Commands from which the invalids were sent, it appears to be unnecessary to make them the subject of further comment.

XV.—SUMMARY.

Summary. The following Tables show the sickness, mortality, and invaliding of the army at home and abroad during the year 1864, and also the average of the four preceding years :—

SUMMARY, showing the Amount of Sickness, Mortality, and Discharges by Invaliding, in the Army, at Home and Abroad, during the year 1864.

Troops in	White Troops.							Colonial Corps.*						
	Mean Strength.	Admissions into Hospital.	Deaths.	Discharges by Invaliding.	Annual Ratio per 1,000 of Strength.			Mean Strength.	Admissions into Hospital.	Deaths.	Discharges by Invaliding.	Annual Ratio per 1,000 of Strength.		
					Admitted.	Died.	Discharged as Invalids.					Admitted.	Died.	Discharged as Invalids.
United Kingdom	73,252	70,806	732	2,325	967	9·99	31·7							
Mediterranean	12,350	9,262	85	274	750	6·88	22·2	569	567	3	..	914	6·53	..
British America	14,114	9,827	326	154	696	23·10	10·9							
West Indies	1,796	2,420	25	25	1,347	13·92	13·9	3,639	5,144	152	95	1,414	41·77	26·1
Western Africa	..	..	..	..	..	..	..							
St. Helena	531	346	4	6	652	7·53	11·3							
Cape of Good Hope	4,123	3,698	36	110	897	8·71	26·7							
Mauritius	1,789	1,290	21	53	721	11·74	29·6							
Ceylon	867	1,479	30	43	1,706	34·59	49·6	1,417	1,682	46	9	1,187	32·47	6·3
Australasia	9,835	7,093	223	195	721	22·67	19·8							
China and Japan	2,629	5,020	119	..	1,909	45·26	..	1,553	1,683	40	..	1,084	25·75	..
India	65,102	99,598	1,428	1,105	1,530	21·93	14·7							
On board Ship†	4,884	3,272	56	..	670	11·47	..	122	110	7	..	902	57·38	..
Total	191,272	214,111	3,085	4,290	1,119	16·13	22·4	7,300	9,186	248	..	1,258	33·97	..

* Under this head are included only such Colonial Corps as are not composed of natives of Great Britain. The Canadian Rifles and the St. Helena Regiment are included in the first division of the Table.

† The deaths of invalids on their passage home are not included under this head, as they are accounted for among the deaths of the stations from which they were invalided.

SUMMARY showing the Amount of Sickness, Mortality, and Discharges by Invaliding in the Army at Home and Abroad during the four Years 1860-3.

Troops in	White Troops.							Colonial Corps*						
	Aggregate Strength.	Admissions into Hospital.	Deaths.	Discharges by Invaliding.	Annual Ratio per 1,000 of Strength. Admitted.	Died.	Discharged as Invalids.	Aggregate Strength.	Admissions into Hospital.	Deaths.	Discharges by Invaliding.	Annual Ratio per 1,000 of Strength, Admitted.	Died.	Discharged as Invalids.
United Kingdom	340,776	344,318	3,149	12,291	1,010	9·24	36·06							
Mediterranean	61,873	50,056	538	897	809	8·70	14·50	2,414	1,952	16	..	809	6·63	..
British America	43,696	28,000	401	492	641	9·18	11·26							
West Indies	7,530	7,423	74	125	986	9·83	16·60	14,248	13,790	379	308	968	26·60	21·62
Western Africa	..	..	..	..	..	..	..							
St. Helena	2,462	2,167	25	12	880	10·16	4·87							
Cape of Good Hope	17,656	15,102	194	304	855	10·99	17·22							
Mauritius	7,834	6,251	184	97	798	23·49	12·38							
Ceylon	3,581	5,273	79	72	1,472	22·06	20·11	5,887	6,690	75	104	1,136	12·74	17·67
Australasia	21,640	13,282	368	288	614	17·00	13·31							
China	20,011	38,242	1,160	278	1,911	57·97	13·89	11,690	19,480	329	..	1,666	28·14	..
India	252,775	447,221	7,608	4,065	1,769	30·10	16·08							
On board Ship†	16,631	10,983	212	..	660	12·75	..	168	128	4	..	762	23·81	
Total	796,465	968,318	13,992	18,921	1,216	17·57	23·76	34,407	42,040	803	..	1,222	23·34	..

* Under this head are included only such Colonial Corps as are not composed of natives of Great Britain. The Canadian Rifles and the St. Helena Regiment are included in the first division of the Table.

† The deaths of invalids on their passage home are not included under this head, as they are accounted for among the deaths of the stations from which they were invalided.

Summary. The sickness, mortality, and invaliding of the white troops have been considerably under the average of the four preceding years. The most striking points of difference are the high rates of mortality in the North American Commands and in Ceylon, and the marked reduction in the proportion of deaths in China and India. There has, however, been a considerable increase in the mortality of the Colonial Corps arising from the field service on the West Coast of Africa and from the prevalence of cholera in the Ceylon Rifles.

FRENCH ARMY.

THE Report on the health of the French Army for the year 1864 states the effective strength of that portion serving in France to have been 273,275, and the average number present 235,700. The cases treated in hospital, regimental infirmary, and quarters, were 525,494, or in the ratio of 2,230 per 1,000 present, and the deaths were 2,461, or 9·01 per 1,000 of effective strength. The average number constantly sick was 12,241, or 51·94 per 1,000 present; the mean sick time to each soldier present, therefore, was 19·01, and the average duration of the cases was 8·52 days.

In Algeria the effective strength was 61,267, and the average number present 54,686. The cases treated were 139,355, the deaths were 1,302, and the average constantly sick was 2,969. These numbers give the proportion of 2,550 cases per 1,000 present, 21·25 deaths per 1,000 effective, and 54·31 constantly sick per 1,000 present. The mean sick time to each soldier present was 19·87, and the average duration of the cases 7·82 days. The high rate of mortality compared with previous years was due to the troops in that colony being engaged on active service. Of the 1,302 deaths reported, 415, or 6·77 per 1,000 of effective strength, were casualties of war, leaving a proportion of 14·48 deaths per 1,000 from other causes.

The effective strength of the French troops in Italy was 13,189, and the average number present 12,437. The cases treated were 33,344, or 2,684 per 1,000 present; the deaths were 172, or 13·05 per 1,000 effective strength, and the mean sick amounted to 759, or 61·01 per 1,000 present. The mean sick time to each soldier was 22·33, and the average duration of the cases 8·33 days.

In that portion of the French report which refers to the mortality according to length of service, special notice is taken of the results published on the same subject in our *Report for 1863*. It was there shown that while the mortality in the French army diminished with length of service up to 14 years, an opposite rule obtained in the British army, the mortality increasing in each quinquennial period of service, and being lowest in that under 5 years. This difference in the results in the two services is thus explained in the French report:—"In France the duration of service is in relation to the age, and, except for an extremely small number of voluntarily enlisted men, there is always a perfect conformity of age among the men of the same class of service. In England age has nothing to do with the conditions of enlistment, and it hence follows that the same class, from 5 to 10 years' service, for instance, may comprise men from 20 to 40 years of age." This explanation is obviously founded on a misapprehension of the recruiting regulations. The maximum age at which a recruit can be enlisted is 25. The great bulk of the recruits are enlisted from the age of 18 to 21 inclusive, as shown in the Table on page 34 of this volume, and it is impossible that men of the class 5–10 years' service could be of the age of 40, as stated in the preceding extract. A clue to the solution of the difference in the progressive rate of mortality in the two services is, however, given in the French report. It is there stated that the returns of the civil population show that in France the highest rate of mortality between 5 and 45 years of age is in the period 20–25, and that it decreases in the two next quinquennial periods—a result

in accordance with the law of mortality observed in the army. But in England the progressive rate of mortality among the civil male population differs materially from this. The lowest proportion of deaths occurs at the age 10-15, and it increases in every subsequent quinquennium. The increase of mortality in the army with length of service is therefore, as in France, in accordance with the law which regulates the mortality of the civil population. The difference in the two services, therefore, probably depends on some cause affecting the general population of the two kingdoms, and we have no doubt is also influenced by those differences in the constitution and system of the two armies, which were detailed in our last report.*

* Army Medical Department Reports, vol. v., for the year 1863, p. 160.

APPENDIX

TO

STATISTICAL REPORT FOR 1864.

APPENDIX TO STATISTICAL REPORT FOR 1864.

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APPENDIX No. I.

ABSTRACT, showing the Admissions into Hospital, Deaths and Invaliding among the Troops in the United Kingdom in 1864.

Diseases.	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry.			Cavalry Depôts.			Roy. Art. Depôt Brigade.			Infantry Depôt Battalions.		
Strength	1,216			8,586			7,440			1,134			4,192			20,748			1,025			3,213			15,599		
	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
I. *Zymotic Diseases.*																											
1. Miasmatic:																											
Variola	5	1	..	13	..	..	15	1	..	..	..	..	3	1	..	31	5	..	..	..	..	..	..	..	19	2	..
Varioloides	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	9	..	..
Varicella	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	1	..	..	8	..	..
Morbilli	4	..	..	..	..	..	3	..	..	..	..	..	23	1	..	5	..	..	..	..	..	..	..	..	12	..	..
Scarlatina	..	..	..	9	..	..	5	1	..	3	..	..	14	..	..	17	..	..	1	..	..	6	1	..	18	..	..
Tonsillitis	67	..	..	303	1	..	253	1	..	43	..	..	252	..	..	544	2	..	70	..	..	166	..	..	785	1	1
Influenza	..	..	..	122	..	..	131	..	..	3	..	..	108	..	..	253	..	..	59	..	..	18	..	..	288	1	..
Coryza	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ophthalmia	5	..	..	107	..	7	124	..	7	11	..	..	37	..	1	420	..	26	27	..	..	49	..	2	588	..	25
Erysipelas	4	..	..	12	1	..	17	..	..	2	..	..	38	4	..	28	4	..	2	..	..	6	..	..	49	1	..
Furunculus	28	..	..	91	..	..	140	..	..	12	..	..	48	..	..	153	..	..	31	..	..	90	..	..	219	..	..
Anthrax . ..	..	..	..	9	..	..	1	..	..	..	..	..	3	..	..	21	..	..	1	..	..	4	..	..	10	1	..
Pyæmia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..
Dysenteria Acuta ..	..	..	..	1	..	..	4	..	..	..	..	..	1	..	..	14	1	2	..	..	..	..	..	..	8	..	1
,, Chronica	..	..	..	1	..	1	9	..	..	..	..	..	..	..	..	12	2	3	2	..	..	7	..	1	16	..	2
Diarrhœa	29	..	..	131	1	..	192	..	2	16	..	..	149	..	1	244	..	4	19	..	..	51	..	..	192	2	1
Cholera	..	..	..	2	..	..	..	..	..	2	..	..	..	..	..	2	1	..	..	..	..	1	..	..	2	..	..
Febris Intermittens	1	..	..	15	..	..	57	..	..	..	..	..	3	..	..	91	1	3	1	..	..	46	1	..	99	1	1
,, Remittens ..	..	..	..	..	..	..	6	..	..	..	..	..	1	..	..	2	..	..	1	..	..	3	1	..	2	..	..
, Typhoides ..	..	1	..	4	1	..	4	..	..	5	..	..	3	4	..	11	4	..	..	1	..	1	1	..	4	1	..

Febris Typhus ..	..	..	..	1	1	..	1	..	..	..	..	..	..	1	..	12	3	..	..	..	..	1	1	..	7	1	..
„ Continua ..	18	..	..	170	1	..	152	3	..	17	..	..	151	..	..	382	4	..	18	1	..	45	..	..	607	10	2
Rheumatismus Acut.	43	..	..	260	..	1	191	..	..	58	..	..	153	1	2	414	..	8	20	..	..	59	..	..	314	..	3
„ Chron.	5	..	1	173	1	26	168	..	17	8	..	..	36	..	..	422	..	36	42	..	1	22	..	1	368	..	30
Parotitis	1	..	..	9	..	..	4	..	..	..	..	..	2	..	..	17	..	..	1	..	..	..	..	..	34	..	..
Cynanche Trachealis	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Diphtheria	..	..	..	1	1	..	..	..	..	..	..	..	1	..	..	5	1	..	..	..	..	..	..	..	2	..	..
Pertussis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Vaccinia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	10	..	..
2. Enthetic:																											
Syphilis Primaria ..	60	..	..	842	..	..	765	..	..	114	..	..	722	..	..	1704	..	..	60	..	..	222	..	..	1231	..	..
„ Secundaria	23	..	..	423	1	19	266	1	16	60	..	2	140	..	5	676	5	29	29	..	1	87	..	3	380	2	18
Cachexia Syphiloidea	..	..	..	..	..	..	..	..	..	..	..	..	4	..	5	..	..	2	..	..	..	..	..	..	..	..	..
Iritis Syphilitica ..	..	..	..	32	..	..	25	..	..	2	..	..	13	..	..	32	..	..	2	..	..	1	..	..	19	..	1
Bubo	16	..	..	246	..	..	204	..	1	39	..	..	103	..	..	559	..	..	23	..	1	55	..	..	308	..	1
Gonorrhœa	57	..	..	724	..	..	813	..	..	155	..	..	324	..	..	1962	..	..	128	..	..	403	..	..	1963	..	..
Phymosis, &c. ..	..	..	..	10	..	..	6	..	..	..	..	..	9	..	..	28	..	..	2	..	..	8	..	..	31	..	..
Orchitis(Gonorrhœal)	12	..	..	43	..	..	57	..	..	2	..	..	72	..	..	153	..	..	2	..	..	19	..	..	106	..	..
Strictura Urethræ ..	4	..	..	27	..	4	18	..	1	2	..	..	13	..	..	53	1	2	10	..	..	6	..	1	51	..	4
Verrucæ	..	..	..	7	..	..	21	..	..	2	..	..	18	..	..	37	..	..	5	..	..	18	..	..	31	..	..
Ophthalmia (Gon:)	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Ulcus Penis ..	..	..	..	..	..	..	26	..	..	1	..	..	1	..	..	1	..	..	..	..	..	..	..	..	2	..	..
3. Dietic:																											
Scorbutus	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	4	..	..	1	..	..	1	..	..	6	..	..
Purpura	..	..	..	1	..	..	..	..	..	..	..	..	3	..	..	2	..	..	..	..	..	..	..	..	..	..	..
Ebriositas	2	..	..	34	..	..	145	..	..	11	..	..	40	..	..	125	3	..	9	1	..	19	1	..	140	1	..
Bronchocele ..	..	..	..	2	..	..	3	..	1	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	1	..	..
4. Parasitic:																											
Porrigo	..	..	..	9	..	..	8	..	..	..	..	..	6	..	..	26	..	..	..	..	..	3	..	..	38	..	1
Scabies	15	..	..	212	..	..	165	..	..	47	..	..	205	..	..	629	..	..	48	..	..	171	..	..	941	..	..
Tænia Solium ..	1	..	..	1	..	..	8	..	..	..	..	..	4	..	..	4	..	..	..	..	..	1	..	..	10	..	..
Phthiriasis	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..
Ascaris Lumbricoides	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..

Appendix No. I.—*continued.*

Strength	Household Cavalry. 1,216			Cavalry. 8,586			Royal Artillery. 7,440			Military Train. 1,134			Foot Guards. 4,192			Infantry. 20,748			Cavalry Depôts. 1,025			Roy. Art. Depôt Brigade. 3,213			Infantry Depôt Battalions. 15,599		
Diseases.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Ascaris Vermicularis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Vermes	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	3	..	..	..	..	..	1	..	..	2	..	..
Aphthæ	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
II. *Constitutional Diseases.*																											
1. Diathetic:																											
Podagra	3	..	..	6	..	..	1	..	..	1	..	..	..	..	..	1	..	..	1	..	..	..	..	..	1	..	..
Lumbago	12	..	..	18	..	..	26	..	..	1	..	..	7	..	..	36	..	..	..	..	..	10	..	..	21	..	..
Anæmia	..	..	..	..	..	..	8	..	2	..	..	..	1	..	..	11	..	2	..	..	..	..	..	..	5	..	..
Cachexia	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Anasarca	1	..	..	4	..	..	7	..	..	..	..	..	3	..	..	13	..	2	..	..	..	2	..	..	3	..	..
Tumores	..	..	..	..	..	..	5	..	1	..	..	..	5	..	..	11	1	2	..	..	..	6	..	..	6	..	..
Scirrhoma	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Carcinoma	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Lupus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	2	..	..
2. Tubercular:																											
Scrofula	..	..	..	18	..	4	26	..	4	1	..	1	20	..	12	61	1	15	..	..	..	5	..	1	48	..	9
Phthisis Pulmonalis	8	..	13	61	15	46	82	14	47	6	4	2	57	11	46	245	37	146	11	4	1	26	14	8	191	50	115
Hæmoptysis ..	2	..	..	15	1	2	22	..	2	4	..	..	16	..	4	44	4	9	..	..	..	7	1	1	30	6	2
Abscessus Psoanus..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	1	..
Morbus Coxarius ..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..	2	..	4
Apostema Lumbare	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..

| III. *Local Diseases.* | | |

Appendix No. I.—*continued.*

Strength	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry.			Cavalry Depôts.			Roy. Art. Depôt Brigade.			Infantry Depôt Battalions.		
	1,216			8,586			7,440			1,134			4,192			20,748			1,025			3,213			15,599		
Diseases.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Ozæna	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Aphonia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
2. Circulatory Syst:																											
Carditis	..	..	..	2	..	..	3	1	..	..	..	..	..	..	..	9	..	6	1	..	..	..	..	..	10	..	2
Pericarditis	..	..	..	4	..	..	1	..	..	..	..	..	1	..	..	6	..	..	..	..	..	1	..	..	5	..	..
Hypertrophia Cordis	..	..	1	2	..	..	14	..	2	..	..	..	..	..	1	48	3	24	..	..	2	2	1	..	11	..	6
Atrophia Cordis	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..
Degeneratio Cordis	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..
Morbus Valv: Cordis	..	..	..	28	4	16	33	3	12	2	..	4	11	..	11	40	4	30	..	..	..	1	..	..	..	..	..
Morbus Cordis	..	..	..	..	..	2	3	..	2	2	..	2	6	..	..	..	1	6	3	..	..	10	1	4	60	5	28
Syncope	..	..	..	1	..	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	9	..	..
Palpitatio	..	..	..	1	..	..	3	..	..	1	..	..	4	..	..	8	..	2	..	..	..	..	..	..	2	1	..
Angina Pectoris	..	..	..	4	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	18	..	4
Aneurisma Aortæ	..	1	..	2	2	..	2	..	1	1	1	..	..	..	..	4	7	1	1	1	..	1	..	1	..	..	..
Aneurisma	..	..	..	7	3	2	1	8	1	..	1	..	4	1	1	1	3	1	..	..	..	1	1	..	..	3	..
Varix	..	4	..	1	9	..	17	13	..	13	2	..	..	9	..	3	48	..	68	..	..	..	5	..	4	26	..	19
3. Respiratory Syst:																											
Laryngitis	..	..	..	5	1	..	1	..	1	1	..	..	2	..	..	3	..	..	..	..	..	..	..	..	6	1	..
Bronchitis Acuta	86	..	..	479	2	13	476	1	..	80	2	..	435	2	14	975	10	10	19	..	..	263	1	1	802	4	1
„ Chronica	2	..	..	77	..	4	121	..	21	3	..	1	60	..	7	305	6	32	12	..	..	20	1	3	219	2	28
Pleuritis	..	..	..	25	..	1	41	1	4	16	..	..	23	1	4	87	2	10	..	..	..	5	..	..	63	1	1

| | | |

Appendix No. I.—*continued.*

Diseases.	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry.			Cavalry Depôts.			Roy. Art. Depôt Brigade.			Infantry Depôt Battalions.		
Strength	1,216			8,586			7,440			1,134			4,192			20,748			1,025			3,213			15,599		
	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
5. Urinary System:																											
Nephritis	..	..	..	3	..	..	6	..	2	..	..	..	3	..	1	4	..	1	..	..	..	..	..	..	1	1	..
Nephria	1	..	..	2	..	..	4	2	1	..	..	..	1	..	1	14	1	4	..	..	..	2	..	..	12	2	3
Ischuria	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	1	..	..	..	..	..	3	..	..
Dysuria	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	4	..	1	..	..	..	..	..	..	..	..	..
Hæmaturia	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	7	..	..	1	..	..	4	..	1	5	..	..
Lithiasis	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Cystitis	1	..	..	1	..	..	3	..	..	..	..	..	..	..	..	2	1	1	..	..	..	..	..	..	1	..	..
Calculus Vesicæ ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..
Fistula in Perineo ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..
Enuresis	..	..	..	5	..	1	13	..	1	1	..	..	2	..	1	21	..	..	2	..	..	1	..	..	41	..	4
Diuresis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	1	..	..
Diabetes	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..
6. Reproductive Syst:																											
Morbus Testis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..											
Fungus „ ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Varicocele	..	..	..	4	..	1	4	..	..	..	..	1	3	..	2	7	..	..	..	..	..	2	..	..	..	..	..
Hydrocele	..	..	..	19	..	1	9	..	1	..	..	..	3	..	..	8	..	1	1	..	..	..	..	..	6	..	2
Hæmatocele	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	11	..	1
Orchitis (not Gonorr:)	10	..	..	129	..	8	103	..	5	4	..	..	18	..	1	225	..	3	18	..	..	35	..	..	115	..	2
Sarcocele	..	..	..	7	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	2	..	1	1	..	..
Spermatorrhœa	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..

| | | |

Appendix No. I.—*continued.*

	Household Cavalry.			Cavalry.			Royal Artillery.			Military Train.			Foot Guards.			Infantry.			Cavalry Depôts.			Roy. Art. Depôt Brigade.			Infantry Depôt Battalions.		
Strength	1,216			8,586			7,440			1,134			4,192			20,748			1,025			3,213			15,599		
Diseases.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Phlegmon	50	..	..	569	..	..	298	..	..	33	..	..	158	..	1	910	..	2	59	..	..	146	..	1	1003	..	3
Abscessus	33	..	..	140	..	1	118	..	2	4	..	..	110	..	4	363	..	7	11	..	..	64	..	..	192	1	4
Paronychia	1	..	..	49	..	..	42	..	..	5	..	..	7	..	..	68	..	..	5	..	..	17	..	..	85	..	1
Ulcus	27	..	..	580	..	10	398	..	8	38	..	..	148	..	1	711	..	3	100	..	..	163	..	2	789	..	12
IV. *Developmental Diseases.*																											
4. Diseases of Nutrition:																											
Atrophia	..	..	1	6	..	..	6	1	2	1	..	..	..	..	..	41	..	15	2	..	..	23	..	1	48	..	8
Debilitas	..	..	..	1	..	..	..	..	..	..	..	..	3	..	..	2	..	..	..	..	..	..	..	..	8	..	1
Obesitas	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Senectus	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	5
"Worn Out" ..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
V. *Violent Deaths or Diseases.*																											
1. Accidental:																											
Ambustio	1	..	..	22	..	..	20	..	1	..	..	..	5	..	..	63	..	..	3	..	..	4	..	..	60	..	..
Explosio	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Insolatio	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Submersio	..	1	..	..	..	..	1	2	..	..	..	..	..	2	..	1	5	..	..	..	..	..	..	..	..	6	..
Fractura	3	..	1	46	1	3	29	1	4	4	..	1	8	..	1	63	2	5	6	..	..	15	..	..	41	1	3
Amputatio	..	..	..	1	..	5	2	..	1	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	2	..	..

ra Hepatis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
ias Ferreas ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
io	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
ntusio	69	..	..	567	2	4	477	..	3	56	..	..	77	..	..	618	..	2	63	..	..	151	..	1	501	..	3	..	..
mmotio	..	..	..	2	..	3	1	1	..	..	..	1	..	..	..	2	..	..	..	..	..	..	..	..	2	..	..	..	..
Compressio Cerebri	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Vulnus Sclopetarium	..	..	..	2	..	1	..	..	..	..	..	..	2	1	..	3	..	3	..	..	..	4	..	2	4	..	1	..	..
„ Incisum ..	18	..	..	149	..	3	134	..	1	30	..	..	81	..	1	238	..	..	13	..	..	43	..	..	239	..	1	..	..
Luxatura	2	..	..	14	..	..	9	..	1	..	..	..	1	..	..	19	..	2	..	..	..	..	..	..	7	..	..	..	..
Subluxatio	17	..	..	154	..	1	155	..	..	22	..	..	66	..	1	376	..	1	8	..	..	50	..	..	316	..	1	..	..
Vesicum Pedis ..	..	..	..	9	..	..	23	..	4	1	..	..	21	..	..	109	..	..	3	..	..	16	..	..	145	..	..	..	..
Venenatio	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Morsus Canis ..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
„ Equi ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..	2	..	..	..	..	..	..	..
„ Insectis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
„ Felis ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
2. In Battle:																													
Vulnus Sclopetarium	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
3. Homicidal:																													
Vulnus Incisum ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
4. Suicidal:																													
Vulnus Incisum ..	..	..	..	..	2	..	..	..	..	..	..	..	..	1	..	2	1	..	..	..	..	..	1	..	2	1	..	..	..
„ Sclopetarium	..	..	..	..	3	..	..	1	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	1	2	1	..	..
Venenatio	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Suspendium ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..
Per Vias Ferreas ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
6. Punitus: ..	..	..	..	13	..	..	13	..	..	2	..	..	9	..	..	38	..	..	..	..	..	2	..	..	33	..	..	..	..
Not specified ..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No appreciable disease	..	..	..	2	..	..	..	..	..	..	..	..	1	..	..	5	..	..	..	..	..	..	..	..	5	..	..	..	..
Total ..	845	4	20	7863	66	304	7519	60	277	1030	11	20	4442	44	155	16,599	182	683	1098	12	12	2966	35	69	15,796	155	516		

APPENDIX No. II.

Abstract, showing the Number of Men belonging to the Regiments serving at Home who were Vaccinated during the Year 1864.

	Results.	In those who bore Marks of previous Small-pox.	In those who bore good Marks of previous Vaccination.	In those who bore doubtful Marks of previous Vaccination.	In those who bore no Marks of previous Vaccination or Small-pox.	Total.
Soldiers, not Recruits.	A perfect vaccine pustule	27	264	227	161	679
	A modified ditto	20	167	183	95	465
	A failure in	44	140	134	85	403
	Total	91	571	544	341	1,547
Recruits.	A perfect vaccine pustule	397	4,222	314	545	5,478
	A modified ditto	237	2,304	229	152	2,922
	A failure in	369	2,949	199	193	3,710
	Total	1,003	9,475	742	890	12,110

APPENDIX No. III.

Abstract, showing the Ages of the Men serving in the different Arms at Home, and the Deaths at each Age in 1864.

	Under 20 Years.		20-24.		25-29.		30-34.		35-39.		40 and upwds.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Household Cavalry	64	2	410	1	282	1	172	..	148	..	140	..	1,216	4
Cavalry of the Line	952	3	3,673	18	2,448	13	758	11	504	16	251	5	8,586	66
Royal Artillery ..	340	2	2,095	13	2,994	22	1,537	15	422	7	52	1	7,440	60
Military Train ..	24	..	531	4	448	6	99	1	27	..	13	..	1,142	11
Foot Guards.. ..	780	3	1,325	12	1,200	12	610	14	238	..	39	3	4,192	44
Infantry Regiments	2,276	5	7,015	40	6,449	54	3,082	41	1,668	39	258	3	20,748	182
Total	4,436	15	15,049	88	13,821	108	6,258	82	3,007	62	753	12	43,324	367
Cavalry Depôts ..	236	1	339	1	252	6	82	1	45	2	71	1	1,025	12
Depôt Brigade, R.A.	957	2	996	7	657	7	367	6	187	9	49	4	3,213	35
Depôt Battalions ..	3,935	25	4,510	28	2,833	29	2,080	27	1,795	36	446	10	15,599	155
Total of Depôts..	5,128	28	5,845	36	3,742	42	2,529	34	2,027	47	566	15	19,837	202
Coast Brigade, R.A.	1	..	16	..	153	..	441	15	635	8	194	5	1,440	28

APPENDIX No. IV.

ABSTRACT, showing the Number of Recruits Inspected, and the Number found unfit for Service in each of the Recruiting Districts during the Year 1864.

Districts.		Primary Inspections.	Secondary Inspections.		Total.
			Had been previously examined by Staff Surgeon or other Army Medical Officer.	Had been previously examined by Private Medical Practitioner.	
London ..	Inspected	3,912	218	1,245	5,375
	Rejected	1,740	28	225	1,993
Liverpool..	Inspected	1,939	96	836	2,871
	Rejected	1,056	18	288	1,362
Bristol ..	Inspected	366	63	854	1,283
	Rejected	119	7	183	309
Leeds ..	Inspected	473	67	450	990
	Rejected	215	9	146	370
Edinburgh	Inspected	830	52	206	1,088
	Rejected	208	..	21	229
Glasgow ..	Inspected	1,148	12	82	1,242
	Rejected	480	3	10	493
Dublin ..	Inspected	1,482	21	259	1,762
	Rejected	690	2	63	755
Cork ..	Inspected	359	80	159	598
	Rejected	165	6	23	194
Belfast ..	Inspected	368	25	337	730
	Rejected	190	2	95	287
Total	Inspected ..	10,877	634	4,428	15,939
	Rejected ..	4,863	75	1,054	5,992

APPENDIX No. V.

ABSTRACT, showing the Native Country of the Recruits inspected at the Head Quarters of each of the Districts in 1864.

Districts.	England.		Wales.		Scotland.		Ireland.		British Colonies or Foreign Countries.	
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.
London ..	3,367	1,521	27	13	159	43	341	156	18	7
Liverpool ..	1,060	594	78	30	122	57	652	360	27	15
Bristol ..	294	95	25	7	2	1	43	16	2	..
Leeds ..	340	160	1	..	15	8	116	47	1	..
Edinburgh ..	30	9	..	..	732	179	67	19	1	1
Glasgow ..	44	22	..	..	797	340	306	118	1	..
Dublin ..	41	16	1	1	4	1	1,435	672	1	..
Cork.. ..	5	2	..	..	..	..	353	162	1	1
Belfast ..	11	4	..	..	9	6	347	179	1	1
Total ..	5,192	2,423	132	51	1,840	635	3,660	1,729	53	25

APPENDIX No. VI.

ABSTRACT, showing the Number of Recruits Inspected in 1864 at the following Ages and Heights.

I.—AT HEAD-QUARTERS OF RECRUITING DISTRICTS.

Age.	Under 5 ft. 3 in.	From 5 ft. 3 in. to 5 ft. 4 in.	From 5 ft. 4 in. to 5 ft. 5 in.	From 5 ft. 5 in. to 5 ft. 6 in.	From 5 ft. 6 in. to 5 ft. 7 in.	From 5 ft. 7 in. to 5 ft. 8 in.	From 5 ft. 8 in. to 5 ft. 9 in.	From 5 ft. 9 in. to 5 ft. 10 in.	From 5 ft. 10 in. to 5 ft. 11 in.	From 5 ft. 11 in. to 6 ft.	Upwards of 6 ft.	Total of each Age.
Boys under 17 ...	423	12	8	5	...	1	...	...	...	...	...	449
From 17 to 18 ...	2	5	154	380	207	46	16	4	...	1	1	816
,, 18 to 19 ...	...	5	178	2,100	1,361	758	245	95	32	13	4	4,791
,, 19 to 20 ...	...	7	91	1,018	891	503	226	128	51	24	9	2,948
,, 20 to 21 ...	...	5	65	648	491	389	200	106	58	17	7	1,986
,, 21 to 22 ...	...	...	52	400	347	267	161	90	49	23	8	1,397
,, 22 to 23 ...	...	1	27	287	292	203	148	101	48	20	7	1,134
,, 23 to 24 ...	...	...	30	203	238	178	153	81	33	18	10	944
,, 24 to 25 ...	...	...	19	180	187	196	171	111	67	24	12	967
25 and upwards ...	...	2	13	61	124	133	72	46	28	15	13	507
Total of each Height	425	37	637	5,282	4,138	2,674	1,392	762	366	155	71	15,939

II.—AT REGIMENTS AND DEPÔTS.

Age.	Under 5ft. 3 in.	From 5 ft. 3 in. to 5 ft. 4 in.	From 5 ft. 4 in. to 5 ft. 5 in	From 5 ft. 5 in. to 5 ft. 6 in.	From 5 ft. 6 in. to 5 ft. 7 in.	From 5 ft. 7 in. to 5 ft. 8 in.	From 5 ft. 8 in. to 5 ft. 9 in.	From 5 ft. 9 in. to 5 ft. 10 in.	From 5 ft. 10 in. to 5 ft. 11 in.	From 5 ft. 11 in. to 6 ft.	Upwards of 6 ft.	Total of each Age.
Boys under 17 ...	560	32	18	9	...	3	...	...	...	...	...	622
From 17 to 18 ...	19	44	302	577	352	184	77	22	4	8	4	1,593
,, 18 to 19 ...	3	33	422	2,026	1,556	765	355	134	44	35	46	5,419
,, 19 to 20 ...	1	13	209	1,073	870	471	296	130	64	38	29	3,194
,, 20 to 21 ...	...	1	99	646	588	383	243	130	72	40	26	2,228
,, 21 to 22 ...	...	2	60	297	325	275	172	89	62	28	33	1,343
,, 22 to 23 ...	...	1	46	249	269	205	126	96	38	9	20	1,069
,, 23 to 24 ...	...	1	31	176	153	136	108	67	40	18	17	747
,, 24 to 25 ...	1	...	18	106	121	91	67	47	32	13	11	507
25 and upwards ...	...	...	13	70	98	81	79	54	32	25	24	476
Total of each Height	584	127	1,218	5,229	4,332	2,594	1,523	769	388	214	220	17,198

Appendix No. VI.—*continued.*

III.—BY CIVIL MEDICAL PRACTITIONERS.

Age.	Under 5 ft. 3 in.	From 5 ft. 3 in. to 5 ft. 4 in.	From 5 ft. 4 in. to 5 ft. 5 in.	From 5 ft. 5 in. to 5 ft. 6 in.	From 5 ft. 6 in. to 5 ft. 7 in.	From 5 ft. 7 in. to 5 ft. 8 in.	From 5 ft. 8 in. to 5 ft. 9 in.	From 5 ft. 9 in. to 5 ft. 10 in.	From 5 ft. 10 in. to 5 ft. 11 in.	From 5 ft. 11 in. to 6 ft.	Upwards of 6 ft.	Total of each Age.
Boys under 17 ...	49	6	6	1	...	...	1	...	...	...	...	63
From 17 to 18 ...	...	4	74	115	56	80	32	5	1	...	...	367
,, 18 to 19 ...	...	2	459	1,489	740	400	217	89	37	7	5	3,445
,, 19 to 20 ...	...	4	204	823	532	287	194	105	48	19	7	2,223
,, 20 to 21 ...	...	1	106	447	328	176	125	66	33	20	14	1,316
,, 21 to 22 ...	...	...	57	240	173	99	107	52	31	12	13	784
,, 22 to 23 ...	...	...	38	173	137	109	100	56	26	14	11	664
,, 23 to 24 ...	...	...	28	142	113	91	69	36	27	11	2	519
,, 24 to 25 ...	...	...	30	146	138	82	79	52	34	5	4	570
25 and upwards ...	...	...	6	44	50	28	28	24	12	7	5	204
Total of each Height	49	17	1,008	3,620	2,267	1,352	952	485	249	95	61	10,155

APPENDIX No. VII.

ABSTRACT, showing the Number of Recruits Inspected in 1864, at the Head-Quarters of Recruiting Districts at the following Weights and Ages.

Ages and Country.	Under 100 lbs.	From 100 lbs. to 110 lbs.	From 110 lbs. to 120 lbs.	From 120 lbs. to 130 lbs.	From 130 lbs. to 140 lbs.	From 140 lbs. to 150 lbs.	From 150 lbs. to 160 lbs.	From 160 lbs. to 170 lbs.	From 170 lbs. and upwards.	Total
Boys under 17—										
England	307	5	7	...	...	...	...	...	...	319
Scotland	3	...	...	...	...	...	...	...	...	3
Ireland	105	15	5	2	...	...	...	...	...	127
From 17 to 18—										
England	...	45	165	182	83	12	1	...	...	488
Scotland	2	19	40	19	9	2	2	...	...	93
Ireland	1	34	124	55	20	4	...	...	...	235
From 18 to 19—										
England	...	47	499	1,375	739	167	36	17	4	2,884
Scotland	...	50	293	322	158	39	18	...	1	881
Ireland	2	34	310	388	205	76	8	2	1	1,026
From 19 to 20—										
England	...	21	216	848	586	217	55	32	1	1,976
Scotland	...	8	83	147	126	52	20	8	1	445
Ireland	...	7	80	170	169	72	24	5	...	527
From 20 to 21—										
England	...	4	158	434	490	210	65	28	6	1,395
Scotland	...	...	21	72	91	40	10	...	...	234
Ireland	...	...	42	90	114	83	20	5	3	357
From 21 to 22—										
England	...	2	81	344	352	192	47	12	2	1,032
Scotland	...	1	18	44	63	38	15	5	...	184
Ireland	...	2	13	40	53	46	19	6	2	181
From 22 to 23—										
England	...	...	51	201	242	217	81	25	4	821
Scotland	...	1	15	36	32	33	14	2	2	135
Ireland	...	4	13	34	59	42	18	5	3	178
From 23 to 24—										
England	...	...	12	146	222	196	66	34	3	679
Scotland	...	1	18	16	29	26	6	7	1	104
Ireland	...	...	8	40	41	46	18	7	1	161
From 24 to 25—										
England	...	...	15	118	129	169	98	38	3	570
Scotland	...	1	10	38	56	39	25	13	6	188
Ireland	...	1	11	41	58	50	33	10	5	209
Upwards of 25—										
England	...	...	5	66	126	100	48	6	4	355
Scotland	...	...	3	7	22	12	12	6	1	63
Ireland	...	...	7	11	27	23	16	5	...	89
Total	420	302	2,320	5,286	4,301	2,203	775	278	54	15,939

APPENDIX No. VIII.

ABSTRACT, showing the State of Education of the Recruits examined at the the Head Quarters of the Recruiting Districts and at Regiments and Depôts in 1864.

Districts.	Well Educated.	Able to Write.	Able to Read only.	Unable to Read.	Total.
Recruiting Districts ..	534	6,596	1,069	2,678	10,877
Regiments and Depôts	609	3,892	893	1,190	*6,584
Total	1,143	10,488	1,962	3,868	17,461

* The difference between this total and that shown in previous Tables is due to the omission of information as to the education of 138 recruits in the 9th, 12th, and 14th Depôt Battalions.

APPENDIX No. IX.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Troops serving in the Mediterranean in the year 1864.

Stations	Gibraltar.		Malta.		Ionian Islands.		Native Troops. R. Malta Fencibles.	
Strength	5,281		5,654		1,415		567	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. Zymotic Diseases.								
1. Miasmatic Diseases:								
Morbilli	5	..	6	..	..	..	32	..
Tonsillitis	59	..	82	..	30	..	10	..
Influenza	35	..	5	..	2	..	..	..
Ophthalmia	261	..	342	..	106	..	46	..
Erysipelas	8	..	7	..	3	..	..	..
Furunculus	50	..	65	..	13	..	..	..
Anthrax	1	..	7	..	..	..	1	..
Dysenteria Acuta	14	..	31	3	..	..	..	..
„ Chronica	3	..	16	..	..	..	..	..
Diarrhœa	52	..	242	..	7	..	17	1
Cholera Biliosa	..	..	1	..	..	..	..	..
Febris Intermittens	9	..	7	..	12	..	1	..
„ Remittens	..	..	18	..	1	..	..	..
„ Typhoides	6	2	9	3	..	..	..	..
„ Continua	268	4	1048	3	35	..	12	..
Rheumatismus Acutus	110	..	82	..	12	..	60	..
„ Chronicus	71	..	100	..	6	..	1	..
Parotitis	1	..	1	..	1	..	..	..
Pertussis	1	..	..	..	..	..	..	..
Diphtheria	..	..	1	..	..	..	..	..
2. Enthetic Diseases:								
Syphilis Primaria	363	..	71	..	25	..	15	..
„ Secundaria	45	..	43	..	15	..	1	..
Ulcus Penis	5	..	..	..	..	..	..	..
Iritis Syphilitica	..	..	5	..	..	..	..	..
Bubo	67	..	24	..	22	..	..	..
Gonorrhœa	309	..	128	..	11	..	28	..
Phymosis, &c.	9	..	4	..	..	..	1	..
Orchitis (Gonorrhœal)	19	..	3	..	3	..	2	..
Strictura Urethræ	12	..	23	..	6	..	..	..
Verrucæ	6	..	..	..	..	..	..	..
3. Dietic Diseases:								
Scorbutus	..	..	3	..	..	..	..	..
Ebriositas	28	..	110	..	16	..	1	..
4. Parasitic Diseases:								
Aphthæ	1	..	..	..	..	..	..	..
Porrigo	4	..	1	..	..	..	..	..
Scabies	3	..	9	..	6	..	..	..
Tænia Solium	14	..	50	..	5	..	..	..
Ascaris Lumbricoides	..	..	1	..	..	..	..	..

Appendix No. IX.—*continued.*

Stations	Gibraltar.		Malta.		Ionian Islands.		Native Troops. R. Malta Fencibles.	
Strength	5,281		5,654		1,415		567	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
II. *Constitutional Diseases.*								
1. Diathetic Diseases:								
Lumbago	6	..	25	..	1	..	..	..
Anæmia	5	..	10	1	..	..	..	..
Anasarca	1	..	..	..	1	1	..	..
Tumores	5	..	6	..	..	..	..	..
Carcinoma	..	..	1	..	..	..	2	..
2. Tubercular Diseases:								
Scrofula	5	..	5	..	2	..	..	..
Phthisis Pulmonalis	22	4	25	2	2	1	..	..
Hæmoptysis	8	..	13	..	1	..	..	..
Abscessus Psoanus	..	..	2	1	..	..	..	..
III. *Local Diseases.*								
1. Of the Nervous System:								
Encephalitis	..	..	1	1	..	..	..	..
Meningitis	1	..	1	..	..	..	..	..
Myelitis	1	1	..	..	..	..	1	..
Apoplexia	2	..	1	1	..	..	..	..
Paralysis	1	..	15	..	1	..	2	..
Delirium Tremens	6	1	10	1	2	..	..	..
Mania	1	..	1	..	1	..	..	..
Amentia	8	..	4	1	5	..	..	..
Epilepsia	8	..	23	..	2	..	1	..
Convulsio	..	..	1	..	..	..	5	..
Chorea	..	..	2	..	..	..	..	..
Cephalæa	13	..	26	..	..	..	1	..
Vertigo	..	..	1	..	..	..	..	..
Neuralgia	4	..	18	..	..	..	..	..
Dysecœa	3	..	9	..	1	..	..	..
Otitis	13	..	14	..	2	..	1	..
Encanthus	1	..	..	..	..	..	..	..
Iritis	4	..	1	..	..	..	..	..
Amaurosis	3	..	6	..	1	..	..	..
Retinitis	1	..	..	..	..	..	..	..
Hemeralopia	2	..	1	..	..	..	..	..
Cæcitas	..	..	6	..	2	..	..	..
Fistula Lachrymalis	..	..	3	..	..	..	..	..
Myopia	..	..	1	..	..	..	..	..
Cataractes	..	..	3	..	..	..	..	..
Polypus Nasi	..	..	1	..	..	..	..	..
2. Of the Circulatory System:								
Pericarditis	..	..	..	..	1	..	1	..
Hypertrophia Cordis	1	..	4	1	..	..	..	..
Morbus Valv: Cordis	8	1	34	..	2	..	..	..
Degeneratio Cordis	..	..	..	..	2	..	..	..
Aneurisma Aortæ	1	2	..	..	..	1	..	..
Aneurisma	1	..	1	..	1	2	..	..

Appendix No. IX.—*continued.*

Stations	Gibraltar.		Malta.		Ionian Islands.		Native Troops R. Malta Fencibles.	
Strength	5,281		5,654		1,415		567	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Varix	10	..	31	..	1	..	..	..
Angina Pectoris	2	..	..	..	..	..	..	..
Palpitatio	9	..	1	..	..	..	..	..
3. Of the Respiratory System:								
Laryngitis	1	..	2	..	..	..	..	..
Bronchitis Acuta	99	1	115	..	33	1	56	..
„ Chronica	68	..	87	1	7	..	3	..
Pleuritis	14	1	15	..	4	..	..	..
Hydrothorax	..	..	..	..	..	1	..	..
Pneumonia	15	4	17	..	2	..	..	..
Apoplexia Pulmonalis	1	1	..	..	..	..	..	..
Asthma	7	..	9	..	1	..	..	..
Emphysema	1	..	..	..	..	..	..	..
Epistaxis	..	..	1	..	..	..	..	..
4. Of the Digestive System:								
Stomatitis	..	..	3	..	..	..	..	..
Pharyngitis	..	..	1	..	..	..	..	..
Gastritis	..	..	..	..	..	..	5	..
Peritonitis	2	..	3	..	..	..	..	..
Obstipatio	5	..	36	1	3	..	..	..
Dyspepsia	55	..	154	..	20	..	111	..
Colica	11	..	23	..	4	..	..	..
Ileus	1	..	..	..	..	..	..	..
Hæmatemesis	..	..	4	..	..	..	..	..
Hernia	4	..	6	..	1	..	..	..
Hæmorrhois	15	..	32	..	7	..	1	..
Fistula in ano	1	..	2	..	1	..	..	..
Prolapsus Ani	..	..	1	..	..	..	..	..
Splenitis	3	..	..	..	1	..	..	..
Hepatitis Acuta	4	..	3	..	1	..	5	..
„ Chronica	9	..	10	1	2	..	..	..
Icterus	2	..	31	..	3	..	1	..
Cirrhosis	1	..	1	..	..	..	..	..
Ascites	..	..	3	..	..	..	2	1
Melæna	..	..	2	..	..	..	..	..
Ranula	..	..	2	..	..	..	..	..
5. Of the Urinary System:								
Nephria	..	..	1	1	..	..	..	..
Ischuria	..	..	7	..	1	..	1	..
Hæmaturia	1	..	1	..	1	..	..	..
Cystitis	..	..	1	..	..	..	..	..
Enuresis	1	..	2	..	3	..	..	..
Morbus Prostaticus	..	..	3	..	..	..	..	..
6. Of the Reproductive System:								
Varicocele	2	..	1	..	1	..	..	..
Hydrocele	4	..	8	..	1	..	..	..
Orchitis (not Gonorrhœal)	85	..	83	..	3	..	2	..

Appendix No. IX.—*continued.*

Stations	Gibraltar.		Malta.		Ionian Islands.		Native Troops. R. Malta Fencibles.	
Strength	5,281		5,654		1,415		567	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
7. Of the Locomotive System:								
Arthritis	1	..	10	..	..	..	..	..
Synovitis	9	..	22	..	1	..	..	..
Contractura	1	..	1	..	..	..	..	..
Periostitis	5	..	6	..	2	..	..	..
Necrosis	1	..	2	..	..	..	..	..
Malformatio Pedum	..	..	2	..	..	..	..	..
8. Of the Integumentary System:								
Urticaria	1	..	1	..	..	..	..	..
Eczema	13	..	33	..	9	..	..	..
Herpes	11	..	10	..	4	..	2	..
Impetigo	3	..	4	..	5	..	..	..
Psoriasis	6	..	8	..	5	..	..	..
Lichen	..	..	2	..	..	..	..	..
Lepra	1	..	..	..	..	..	..	..
Mentagra	..	..	2	..	1	..	..	..
Ecthyma	1	..	..	..	..	..	..	..
Pityriasis	..	..	2	..	..	..	..	..
Prurigo	1	..	..	..	..	..	..	..
Pemphigus	..	..	1	..	..	..	..	..
Acne	1	..	2	..	1	..	..	..
Rupia	..	..	..	..	1	..	..	..
Roseola	..	..	4	..	..	..	..	..
Ephelis	..	..	1	..	..	..	..	..
Phlegmon	188	..	404	..	65	..	..	..
Abscessus	58	..	79	1	6	..	59	..
Paronychia	34	..	22	..	3	..	..	..
Ulcus	141	..	225	..	33	..	35	..
IV. *Developmental Diseases.*								
4. Diseases of Nutrition:								
Atrophia	22	..	60	..	8	..	..	..
Debilitas	4	..	..	..	..	..	..	..
V. *Violent Deaths or Diseases.*								
1. Accidental:								
Ambustio	21	..	11	..	2	..	..	..
Explosio	..	..	1	..	1	..	..	..
Submersio	..	..	2	5	..	5	..	..
Fractura	19	..	18	1	3	..	1	..
Amputatio	2	..	..	..	1	1	2	..
Contusio	169	..	297	..	107	..	19	1
Commotio	..	..	2	2	1	..	1	..
Vulnus Sclopetarium	1	..	..	..	4	..	..	..
„ Incisum	70	..	143	..	27	..	16	..
Luxatura	3	..	8	..	1	..	..	..
Subluxatio	73	..	162	..	28	..	..	..
Vesiculæ Pedis	15	..	77	..	..	..	..	..
Morsus Hominis	..	..	1	..	..	..	..	..
„ Canis	..	..	..	..	1	..	..	..

Appendix No. IX.—*continued.*

Stations	Gibraltar.		Malta.		Ionian Islands.		Native Troops. R. Malta Fencibles	
Strength	5,281		5,654		1,415		567	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
3. Homicidal:								
Vulnus Incisum	..	..	..	..	..	1	..	..
„ Sclopetarium	..	..	..	1	..	..	..	..
4. Suicidal:								
Vulnus Incisum	1	..	..	..	..	..	1	..
„ Sclopetarium	..	2	2	1	..	..	..	..
5. Execution:								
Suspendium	..	..	..	1	..	1	..	..
6. Punitus	20	..	18	..	3	..	2	..
No Appreciable Disease	6	..	1	..	..	..	..	..
Total	3,304	24	5,167	34	791	15	567	3

Causes of the Deaths among the Invalids.

	From Gibraltar.	From Malta.	From the Ionian Islands.
Scirrhoma	1	..	..
Scirrhus Pylori	..	1	..
Phthisis Pulmonalis	2	1	1
Morbus Valv: Cordis.	..	1	..
Aneurisma Aortæ	..	..	1
Pneumonia	..	..	1
Pleuritis	1	..	..
Hepatitis Chronica	1	..	..
Asthenia	1	..	..
Total	6	3	3

APPENDIX No. X.

ABSTRACT, showing the Diseases of the Men sent home as Invalids from the Mediterranean during the Year 1864, and of those finally discharged the Service.

Stations	Gibraltar.		Malta.		Ionian Islands.	
Average Strength	5,281		5,654		1,415	
Diseases.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.
I. *Zymotic Diseases.*						
1. Miasmatic.						
Ophthalmia	20	12	4	4	..	1
Erysipelas	..	..	3	..	..	..
Dysenteria Chronica	3	1	..	1	..	..
Diarrhœa	..	..	..	..	..	2
Febris Intermittens	1	3	..	1	..	..
„ Remittens	..	..	1	..	..	1
„ Continua	1	..	..	..	..	..
Rheumatismus Acutus	5	..	1	..	..	..
„ Chronicus	3	5	4	3	..	..
2. Enthetic:						
Syphilis Secundaria	3	3	1	3	..	1
Iritis Syphilitica	..	..	..	..	..	1
Bubo	..	..	..	..	1	..
Stricture Urethræ	..	..	..	1	1	..
Ophthalmia Gon:	1	..	..	..	..	..
3. Dietic:						
Ebriositas	..	..	1	..	..	1
II. *Constitutional Diseases.*						
1. Diathetic:						
Anæmia	..	2	..	..	..	..
2. Tubercular:						
Scrofula	4	5	3	1	2	..
Phthisis Pulmonalis	16	16	20	22	1	12
Hæmoptysis	2	2	3	3	..	2
Abscessus Psoanus	..	..	1	..	..	..
III. *Local Diseases.*						
1. Nervous:						
Apoplexia	1	1	..	3	..	1
Paralysis	1	..	4	..	..	..
Mania	1	..	1	..	..	..
Amentia	8	..	4	..	2	..
Epilepsia	1	3	1	1	..	1
Cephalæa	1	1	1	..	..	..
Dysecœa	1	1	2	1	..	..
Otitis	2	..	..	..	..	..

Appendix No. X.—*continued.*

Stations	Gibraltar.		Malta.		Ionian Islands.	
Average Strength	5,281		5,654		1,415	
Diseases.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.
Cataractes	..	..	1	..	..	..
Amaurosis	3	5	1	1	..	..
Cœcitas	1	1	2	3	1	..
Myopia	5	5	..	..	..	..
2. Circulatory:						
Carditis	..	..	..	..	..	1
Hypertrophia Cordis	1	1	1	1	..	1
Morbus Valv: Cordis	6	6	18	18	1	2
Palpitatio Cordis	4	3	1	..	..	1
Aneurisma Aortæ	1	..	..	..	..	..
Varix	4	4	2	3	..	4
3. Respiratory:						
Laryngitis	1	..	..	..	..	..
Bronchitis Acuta	1	..	2	..	..	..
,, Chronica	9	13	11	11	1	7
Pleuritis	1	..	..	..	..	..
Pneumonia	3	2	..	..	..	1
Asthma	3	..	3	5	2	..
4. Digestive:						
Peritonitis	1	..	..	..	..	..
Dyspepsia	..	1	1	1	1	..
Hæmatemesis	..	..	1	1	..	..
Hernia	1	1	..	..	..	..
Ileus	1	1	..	..	..	..
Hæmorrhois	1	1	..	1	1	..
Hepatitis Chronica	3	2	3	1	..	1
Cirrhosis	1	..	..	1	..	..
Ascites	..	..	1	1	..	..
5. Urinary:						
Nephritis	..	..	..	1	..	..
Nephria	..	..	1	..	..	..
Enuresis	1	..	..	..	..	1
Fistula in Perineo	..	..	..	..	..	1
6. Reproductive:						
Fungus Testis	..	1	..	..	..	..
7. Locomotive:						
Arthritis	..	1	2	3	..	..
Synovitis	..	..	..	..	..	1
Periostitis	1	..	1	..	..	..
Atrophia Musculorum	..	..	..	2	..	1
Contractura	..	2	..	..	..	..
8. Integumentary:						
Impetigo	1	..	..	..	..	..
Psoriasis	..	..	3	1	..	..
Lepra	1	..	..	..	..	..

Appendix No. X.—*continued.*

Stations	Gibraltar.		Malta.		Ionian Islands.	
Average Strength ..	5,281		5,654		1,415	
Diseases.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.	Sent Home.	Discharged at Netley.
Phlegmon	1	..	..	..	..	..
Abscessus	..	..	1	..	..	1
Ulcus	4	4	1	1	..	..
IV. Developmental Diseases.						
4. Diseases of Nutrition:						
Atrophia	3	2	5	3	1	1
Senectus	1	..	2	..	..	..
V. Violent Deaths or Diseases.						
1. Accidental:						
Fractura	2	..	4	4	1	2
Contusio	..	..	4	1	..	1
Vulnus Sclopetarium ..	..	..	..	1	..	..
„ Incisum	1	..	1	..	..	..
Luxatura	..	..	1	1	..	..
Subluxatio	..	..	1	1	..	1
Amputatio	..	1	..	..	..	..
4. Suicidal:						
Vulnus Sclopetarium ..	..	..	1	..	..	..
Total	142	112	131	111	16	50

APPENDIX No. XI.

ABSTRACT, showing the Ages of the Troops serving in the Mediterranean Commands, and the Deaths at each Age, during the Year 1864.

Regiments.		Under 20 Years.		20–24.		25–29.		30–34.		35–39.		40 and upwards.	
		Strength on 1st Jan.	Deaths during Year.	Strength on 1st Jan.	Deaths during Year.	Strength on 1st Jan.	Deaths during Year.	Strength on 1st Jan.	Deaths during Year.	Strength on 1st Jan.	Deaths during Year.	Strength on 1st Jan.	Deaths during Year.
Mediterranean Commands	Royal Artillery	59	..	586	2	657	7	289	4	112	3	16	1
	Royal Engineers	26	2	140	1	223	..	74	1	33	1	2	..
Gibraltar	2nd Battalion 15th Foot ..	13	..	362	2	269	2	106	..	17	..	4	..
	2nd „ 23rd „ ..	18	..	370	1	302	4	120	..	12	1	6	..
	4th Battalion Rifle Brigade..	13	..	397	1	318	..	83	..	11	..	4	..
Gibraltar & Ionian Islands	1st Battalion 9th Foot ..	24	..	286	1	365	1	93	1	46	3	4	..
Malta	2nd Battalion 7th Foot ..	11	..	353	1	327	..	113	..	28	1	2	..
	2nd „ 8th „ ..	20	..	374	2	305	..	86	..	23	1	5	..
	1st „ 22nd „ ..	70	..	204	4	280	1	112	..	79	..	26	..
	2nd „ 22nd „ ..	14	..	315	1	306	1	134	2	22	1	11	1
	100th Regiment	39	..	301	1	263	1	175	1	16	1	..	..
Malta and Ionian Islands	2nd Battalion 4th Foot ..	10	..	434	3	242	2	85	1	11	1	1	..
	Total	317	2	4,122	20	3,857	19	1,470	10	410	13	81	2

APPENDIX No. XII.

ABSTRACT showing the Admissions into Hospital and Deaths among the Troops serving in British America in the Year 1864.

Stations.	Canada.		Bermuda.				Nova Scotia.		Newfoundland.	
Average Annual Strength	9,724		Bermuda, 983.		Det. in Nova Scotia, 114.		2,991		302	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*										
1. Miasmatic Diseases:										
Variola	42	2	..	..	..	..	..	..	..	..
Varioloides	8	..	..	..	..	..	..	..	..	..
Varicella	2	..	..	..	..	..	..	..	..	..
Morbilli	5	..	..	..	..	..	..	..	..	..
Scarlatina	18	1	..	..	..	..	1	..	..	..
Tonsillitis	230	..	3	..	5	..	93	..	7	..
Influenza	68	..	2	..	4	..	83	..	11	..
Ophthalmia	126	..	17	..	1	..	112	..	..	..
Erysipelas	36	1	1	..	3	..	16	1	..	..
Furunculus	37	..	..	..	..	..	18	..	..	..
Anthrax	11	1	..	..	1	..	2	..	..	..
Dysenteria Acuta	8	..	2	..	1	..	2	..	..	..
„ Chronica	1	..	..	..	..	..	..	..	..	..
Diarrhœa	157	..	23	..	1	..	32	1	1	..
Cholera	1	..	..	..	..	..	1	..	..	..
Febris Intermittens	47	..	..	..	..	..	1	..	..	..
„ Remittens	18	3	2	..	..	..	1	..	..	..
„ Icterodes	..	..	490	171	5	4	..	..	..	..
„ Typhoides	7	2	..	..	..	..	1	..	..	..
„ Continua	156	2	11	..	2	..	32	1	..	..
Rheumatismus Acutus	140	..	3	..	5	..	33	..	2	..
„ Chronicus	66	..	10	..	..	..	34	..	..	..
Parotitis	7	..	1	..	..	..	3	..	..	..
Diphtheria	1	..	..	..	..	..	..	..	..	..
2. Enthetic Diseases										
Syphilis Primaria	852	..	9	..	6	..	112	..	..	..
„ Secundaria	183	..	2	..	..	..	40	..	3	..
Cachexia Syphilitica	2	..	..	..	..	..	..	..	..	..
Iritis Syphilitica	5	..	..	..	..	..	1	..	..	..
Bubo	208	..	6	..	..	..	18	..	..	..
Gonorrhœa	659	..	26	..	1	..	246	..	1	..
Phymosis, &c.	5	..	..	..	..	..	4	..	..	..
Orchitis (Gonorrhœal)	49	..	1	..	..	..	11	..	..	..
Ophthalmia (Gonorrhœal)	..	..	1	..	..	..	..	..	..	..
Strictura Urethræ	27	..	2	..	..	..	5	..	..	..
Verrucæ	13	..	1	..	..	..	5	..	..	..
3. Dietic Diseases:										
Scorbutus	2	..	..	..	..	..	1	..	..	..
Ebriositas	189	3	46	..	..	..	50	1	9	..
4. Parasitic Diseases:										
Aphthæ	1	..	..	..	..	..	..	..	..	..

Appendix No. XII.—*continued.*

Stations	Canada.		Bermuda.				Nova Scotia.		Newfoundland.	
Average Annual Strength	9,724		Bermuda, 983		Det. in Nova Scotia, 114		2,991		302	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Porrigo	5	..	3	..	..	..	3	..	..	..
Scabies	45	..	..	..	..	..	39	..	..	..
Tænia Solium	2	..	..	..	..	..	..	..	..	..
Ascaris Lumbricoides	1	..	..	..	..	..	..	..	..	..
II. *Constitutional Diseases.*										
1. Diathetic Diseases:										
Podagra	7	..	..	..	..	..	1	..	..	..
Lumbago	17	..	2	..	1	..	3	..	..	..
Anæmia	1	..	..	..	..	..	..	..	..	..
Anasarca	4	..	..	..	..	..	..	..	..	..
Tumores	8	..	1	..	..	..	..	..	..	..
Carcinoma	1	..	..	..	..	..	..	..	..	..
Lupus	..	..	1	..	..	..	..	..	..	..
2. Tubercular Diseases:										
Scrofula	11	..	3	..	..	..	3	..	..	..
Phthisis Pulmonalis	88	22	7	2	1	..	12	5	..	..
Hæmoptysis	21	..	1	..	..	..	4	..	1	..
Morbus Coxarius	..	..	..	..	..	..	1	..	..	..
III. *Local Diseases.*										
1. Nervous:										
Encephalitis	2	..	..	..	..	..	..	..	..	..
Meningitis	1	1	1	..	..	..	..	..	..	..
Myelitis	1	..	..	..	..	..	..	..	..	..
Apoplexia	2	3	..	..	..	..	..	..	..	..
Paralysis	14	2	1	..	..	..	1	1	..	..
Delirium Tremens	41	2	12	..	..	..	7	..	4	..
Mania	5	..	..	..	..	..	2	..	1	..
Amentia	2	..	..	..	..	..	1	..	..	..
Epilepsia	8	..	2	..	..	..	3	..	..	..
Chorea	1	..	..	..	..	..	..	..	..	..
Convulsio	..	..	..	..	..	..	1	..	..	..
Hysteria	..	..	..	..	..	..	2	..	..	..
Cephalæa	15	..	2	..	..	..	7	..	1	..
Neuralgia	11	..	..	..	..	..	1	..	1	..
Dysecœa	1	..	1	..	..	..	4	..	..	..
Otitis	25	1	1	..	..	..	6	..	..	..
Cæcitas	1	..	..	..	..	..	..	..	1	..
Odontalgia	1	..	..	..	..	..	..	..	..	..
Iritis	2	..	1	..	..	..	..	..	..	..
Amaurosis	..	..	..	..	..	..	1	..	..	..
Cataractes	..	..	..	..	..	..	1	..	..	..
Pterygium	..	..	1	..	..	..	..	..	..	..
2. Circulatory:										
Carditis	1	..	..	..	..	..	..	..	..	..
Pericarditis	1	1	..	..	..	..	2	..	..	..
Hypertrophia Cordis	1	1	..	..	..	..	..	..	..	..

Appendix No. XII.—*continued.*

Stations	Canada.		Bermuda.				Nova Scotia.		Newfoundland.	
Average Annual Strength	9,724		Bermuda, 983		Depôt in Nova Scotia, 114		2,991		302	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Morbus Valv: Cordis	23	4	4	2	..	..	8	2	..	..
„ Cordis	..	1	..	..	..	..	..	..	..	..
Aneurisma Aortæ	2	5	3	1	..	..	..	1	..	..
Aneurisma	1	1	..	..	..	..	..	..	..	..
Varix	12	..	..	..	..	..	..	..	..	..
Syncope	1	..	..	..	..	..	..	..	..	..
Angina Pectoris	4	..	..	..	..	..	1	1	..	..
Phlebitis	1	..	..	..	..	..	2	1	..	..
3. Respiratory:										
Laryngitis	3	..	2	..	..	..	4	..	..	..
Bronchitis Acuta	277	1	15	..	3	1	45	..	9	..
„ Chronica	96	1	4	..	..	..	24	..	3	1
Pleuritis	30	..	3	..	..	..	5	1	1	1
Pneumonia	139	4	..	..	..	..	15	1	1	..
Asthma	1	..	1	..	..	..	3	..	..	..
Emphysema	..	..	..	..	1	..	..	..	..	..
Epistaxis	2	..	..	..	..	..	..	..	..	..
4. Digestive:										
Stomatitis	3	..	..	..	..	..	2	..	..	..
Glossitis	1	..	..	..	..	..	..	..	..	..
Ranula	..	..	..	..	..	..	1	..	..	..
Gastritis	1	..	..	..	..	..	..	1	..	..
Enteritis	6	1	1	1	..	..	..	..	..	..
Peritonitis	1	..	1	1	..	..	1	..	..	..
Obstipatio	14	..	..	..	..	..	..	..	..	..
Dyspepsia	208	..	15	..	4	..	27	..	3	..
Colica	30	..	4	..	1	..	4	..	..	..
Hæmatemesis	3	..	..	..	..	..	1	..	..	..
Hernia	9	..	1	..	..	..	1	..	..	..
Hæmorrhois	40	..	11	..	1	..	12	..	1	..
Fistula in Ano	6	..	1	..	..	..	3	..	..	..
Splenitis	3	..	..	..	..	..	1	..	..	..
Hepatitis Acuta	3	..	1	..	..	..	..	..	..	..
„ Chronica	8	1	1	..	..	..	2	..	..	..
Icterus	37	..	4	..	1	..	5	..	..	..
Ascites	2	1	..	..	..	..	1	..	..	..
5. Urinary:										
Nephritis	2	..	..	..	..	..	..	..	..	..
Nephria	7	2	..	..	..	..	..	..	..	..
Ischuria	..	..	1	..	..	..	..	..	..	..
Hæmaturia	..	..	..	..	..	..	1	..	..	..
Cystitis	1	..	..	..	..	..	..	..	..	..
Fistula in Perineo	1	..	..	..	..	..	1	..	..	..
Enuresis	4	..	..	..	..	..	..	..	..	..
Morbus Prostaticus	1	..	..	..	..	..	..	..	..	..
6. Reproductive:										
Varicocele	..	..	1	..	..	..	..	..	1	..

Appendix No. XII.—*continued.*

Stations	Canada.		Bermuda.				Nova Scotia.		Newfoundland.	
Average Annual Strength	9,724		Bermuda, 983		Det. in Nova Scotia, 114		2,991		302	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Hydrocele	6	..	1	..	..	..	1	..	..	..
Orchitis (not Gonorrhœal)	71	..	12	..	..	..	30	..	..	..
7. Locomotive:										
Arthritis	12	1	..	..	..	..	..	..	..	..
Synovitis	6	..	..	..	..	..	..	..	..	..
Hydrarthrus	..	..	..	..	..	..	2	..	..	..
Contractura	1	..	1	..	..	..	..	..	..	..
Periostitis	8	..	..	..	..	..	1	..	..	..
Caries	1	1	..	..	..	..	..	..	..	..
Necrosis	1	..	..	..	..	..	1	..	..	..
8. Integumentary:										
Urticaria	4	..	..	..	..	..	3	..	..	..
Eczema	30	..	..	..	..	..	8	..	..	..
Herpes	9	..	1	..	..	..	10	..	..	..
Impetigo	5	..	1	..	..	..	2	..	..	..
Psoriasis	14	..	3	..	..	..	7	..	..	..
Acne	2	..	..	..	..	..	..	..	..	..
Rupia	2	..	..	..	..	..	..	..	..	..
Mentagra	1	..	..	..	..	..	..	..	..	..
Pemphigus	..	..	..	..	..	..	4	..	..	..
Pityriasis	1	..	..	..	..	..	..	..	..	..
Epithelisma	1	..	..	..	..	..	..	..	..	..
Phlegmon	506	..	41	..	6	..	140	..	10	..
Abscessus	66	..	12	..	5	..	28	..	2	..
Paronychia	22	..	6	..	..	..	2	..	..	..
Ulcus	331	..	30	..	1	..	74	..	4	..
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	12	..	2	..	..	..	4	..	..	..
Debilitas	1	..	..	..	..	..	..	..	..	..
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Ambustio	66	..	11	..	1	..	15	..	1	..
Explosio	..	9	..	..	..	..	..	..	..	..
Gelatio	68	..	..	..	2	..	9	..	1	..
Insolatio	1	..	..	..	..	..	..	..	..	..
Submersio	..	18	..	..	..	..	..	2	..	..
Asphyxia	..	1	..	..	..	..	..	..	..	..
Fractura	42	..	4	1	..	..	20	1	1	..
Amputatio	4	..	..	..	..	..	1	..	..	..
Contusio	312	..	36	..	6	..	87	..	10	..
Commotio	3	2	..	..	1	..	..	..	..	..
Vulnus Sclopetarium	5	..	..	..	..	..	..	..	..	..
„ Incisum	231	..	30	..	..	..	56	..	2	..
Luxatura	12	..	1	..	..	..	2	..	..	..

Appendix No. XII.—*continued.*

Stations..	Canada.		Bermuda.				Nova Scotia.		Newfoundland.	
Average Annual Strength ..	9,724		Bermuda, 983		Det. in Nova Scotia, 114		2,991		302	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Subluxatio	224	..	23	..	6	..	51	..	5	..
Vesiculæ Pedis. ..	26	..	2	..	..	..	6	..	..	..
Morsus Equi	1	..	..	..	..	..	..	..	..	..
„ Hominis ..	..	..	..	..	..	..	2	..	..	..
3. Homicidal:										
Venenatio	..	..	..	..	..	..	..	1	..	..
4. Suicidal:										
Venenatio	1	1	..	..	..	..	..	..	..	..
Vulnus Incisum ..	2	..	..	..	..	..	..	..	..	..
„ Sclopetarium ..	..	2	..	..	..	..	..	..	..	..
Suspendium	1	..	..	..	..	..	..	..	..	..
6. Punitus	15	..	3	..	2	..	9	..	..	..
No appreciable Disease.	6	..	..	..	..	..	..	..	..	..
Total ..	6,850	105	993	179	78	5	1,808	22	98	2

Causes of the Deaths of the Invalids.

Diseases.	Bermuda.	Nova Scotia, &c.	Canada.	Newfoundland.
Dysenteria Chronica ..	..	..	1	..
Phthisis Pulmonalis ..	2	1	6	..
Delirium Tremens ..	..	1	..	..
Morbus Valv: Cordis ..	..	1	1	..
Total	2	3	8	..

APPENDIX No. XIII.

ABSTRACT, showing the Number of Invalids sent Home from British America, and of Men finally discharged the service as Invalids in British America, and at the Invalid Depôt in England in the Year 1864.

Diseases.	Sent home as Invalids from		Discharged the Service in British America.	Discharged at the Invalid Depôt.	
	Bermuda.	British America.		Bermuda.	British America.
I. *Zymotic Diseases.*					
1. Miasmatic:					
Ophthalmia	1	7	..	1	1
Dysenteria Chronica..	..	1	..	..	..
Diarrhœa	1	..	..	..	..
Rheumatismus Chron:	4	16	2	..	3
2. Enthetic:					
Syphilis Secundaria ..	1	9	..	2	4
Cachexia Syphiloidea	..	2	..	..	..
Strictura Urethræ ..	..	5	..	..	..
II. *Constitutional Diseases.*					
1. Diathetic:					
Anasarca	..	..	..	..	1
Podagra	..	..	..	..	2
2. Tubercular:					
Scrofula	2	3	..	1	3
Phthisis Pulmonalis..	2	71	13	2	42
Hæmoptysis	..	5	..	..	4
Morbus Coxarius ..	..	1	..	..	..
III. *Local Diseases.*					
1. Nervous:					
Paralysis	1	6	2	1	6
Mania	..	3	..	..	..
Amentia	..	5	..	..	..
Epilepsia	1	5	1	..	1
Cephalæa.	2	..	..	..	..
Dysecœa	..	2	..	..	1
Otitis..	..	1	..	..	1
Cataractes	..	2	..	..	..
Cæcitas	..	..	..	1	1
2. Circulatory:					
Carditis	..	..	..	..	1
Pericarditis	..	1	..	..	..
Hypertrophia Cordis	..	1	..	..	2
Morbus Valv: „	..	9	2	..	3
Aneurisma Aortæ ..	1	..	..	..	..
Aneurisma	..	..	..	1	1
Varix..	..	6	1	..	..
Phlebitis	..	1	..	..	..
Angina Pectoris ..	..	1	1	..	1
3. Respiratory:					
Laryngitis	..	2	..	..	..
Bronchitis Acuta ..	..	3	..	..	..
„ Chronica..	..	15	2	..	8
Pleuritis	..	1	..	..	..
Pneumonia	..	2	..	..	..
Asthma	1	2	..	..	..
Emphysema	..	..	..	..	1

Appendix No. XIII.—*continued.*

Diseases.	Sent home as Invalids from		Discharged the Service in British America.	Discharged at the Invalid Depôt.	
	Bermuda.	British America.		Bermuda.	British America.
4. Digestive:					
Gastritis	..	1	..	..	1
Hæmatemesis ..	..	1	..	..	1
Hernia	1	7	2	..	1
Hæmorrhois	1	..	..	1	..
Splenitis	..	..	2	..	..
Hepatitis Chronica ..	..	4	..	..	1
Ascites	..	1	..	..	..
5. Urinary:					
Nephritis	..	1	..	..	..
Nephria	..	2	..	..	..
Enuresis	..	..	..	..	1
6. Reproductive:					
Hydrocele	..	1	..	..	..
Orchitis (not Gon:)..	..	1	..	..	1
7. Locomotive:					
Arthritis	..	2	..	..	1
Contractura	1	2	..	1	3
Caries	..	..	..	..	1
Necrosis	..	1	..	..	..
8. Integumentary:					
Phlegmon	..	2	..	..	..
Abscessus	..	4	..	..	2
Ulcus..	..	7	2	..	1
IV. *Developmental Diseases.*					
4. Diseases of Nutrition:					
Atrophia	..	2	..	1	1
V. *Violent Deaths or Diseases.*					
1. Accidental:					
Gelatio	..	1	..	..	..
Fractura	2	4	2	1	1
Amputatio	..	1	..	..	1
Commotio	..	2	..	..	..
Vulnus Sclopetarium	..	1	..	..	1
„ Incisum ..	..	2	..	..	1
Luxatura	1	1	..	1	1
Subluxatio	4	..	..	1	..
Morsus Hominis ..	..	1	..	..	..
Diseases not specified	..	8	..	..	..
Total	27	248	32	15	107

APPENDIX No. XIV.

ABSTRACT, showing the Ages of the Troops serving in British America, and the Deaths at each Age during the Year 1864.

Station.	Corps.	Under 20.		20–24.		25–29.		30–34.		35–39.		40 and upwards.		Total.	
		Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.	Strength, 1st Jan.	Died.
Bermuda	Royal Artillery ..	7	1	94	12	109	13	14	4	3	1	..	..	227	31
	Royal Engineers ..	6	..	47	9	86	14	27	5	14	2	3	..	183	30
Canada, Nova Scotia, and Newfoundland.	Artillery	26	..	740	11	711	12	410	2	147	2	7	..	2,041	27
	Engineers	9	..	69	..	98	..	32	1	16	..	4	..	228	1
	1st Batt. 15th Foot.	18	..	294	..	291	5	81	1	36	2	15	..	735	8
	1st „ 16th „	106	..	312	2	170	5	62	..	37	2	6	..	693	9
	2nd „ 16th „	40	..	324	3	338	2	59	1	14	..	5	1	780	7
	1st „ 17th „	16	..	203	2	363	2	98	3	37	..	..	..	717	7
	2nd „ 17th. „	38	..	513	3	168	2	63	..	17	1	3	..	802	6
	30th Foot	24	1	243	1	297	3	100	2	39	..	4	..	707	7
	47th „	69	..	301	2	184	3	139	3	26	..	..	..	719	8
	63rd „	83	..	324	3	187	..	61	1	25	1	1	..	681	5
	1st Batt. Rifle Brig.	21	..	216	3	287	8	139	1	22	..	6	..	691	12
	Rl. Canadian Rifles	33	..	18	..	61	2	478	4	378	5	218	5	1,186	16
	Total	496	2	3,698	51	3,350	71	1,763	28	811	16	272	6	10,390	174

APPENDIX No. XV.

ABSTRACT, showing the Admissions into Hospital and Deaths among the White Troops serving in the Windward and Leeward Command and Jamaica, in the Year 1864.

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Demerara.		Trinidad.	
Strength	613		1,090		730		125		235	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*										
1. Miasmatic:										
Variola	1	..	..	..	..	..	..	..	..	..
Varioloides	1	..	..	..	..	..	..	..	..	..
Varicella	1	..	..	..	..	..	..	..	..	..
Tonsillitis	6	..	16	..	13	..	3	..	..	..
Influenza	12	..	1	..	..	..	..	..	1	..
Ophthalmia	10	..	61	..	48	..	4	..	9	..
Erysipelas	..	..	1	..	1	..	..	..	..	..
Furunculus	2	..	13	..	13	..	..	..	..	..
Anthrax	..	..	1	..	..	..	..	..	1	..
Dysenteria Acuta	4	..	15	..	10	..	4	..	1	..
„ Chronica	1	..	1	..	1	..	..	..	..	..
Diarrhœa	38	..	48	1	37	1	2	..	9	..
Febris Intermittens	31	..	104	..	16	..	64	..	24	..
„ Remittens	57	..	338	1	332	..	2	..	4	1
„ Continua	29	..	180	3	47	..	92	3	41	..
„ Icterodes	..	..	1	1	..	..	1	1	..	..
Rheumatismus Acutus.	22	..	10	..	5	..	1	..	4	..
„ Chronicus	14	..	17	..	12	..	2	..	3	..
Parotitis	..	..	2	..	2	..	..	..	..	..
2. Enthetic:										
Syphilis Primaria	28	..	119	..	114	..	2	..	3	..
„ Secundaria	5	..	23	..	18	..	..	..	5	..
Bubo	17	..	25	..	23	..	..	..	2	..
Gonorrhœa	52	..	93	..	85	..	5	..	3	..
Phymosis, &c.	..	..	2	..	2	..	..	..	..	..
Orchitis (Gonorrhœal)	1	..	3	..	1	..	1	..	1	..
Strictura Urethræ	4	..	7	..	6	..	..	..	1	..
Ophthalmia (Gonorrhœal)	..	..	1	..	1	..	..	..	..	..
3. Dietic Diseases:										
Scorbutus	..	..	1	..	1	..	..	..	..	..
Purpura	1	..	..	..	..	..	..	..	..	..
Ebriositas	18	..	40	1	11	..	7	1	22	..
4. Parasitic Diseases:										
Porrigo	..	..	2	..	2	..	..	..	..	..
Scabies	16	..	..	..	..	..	..	..	..	..
Tænia Solium	6	..	4	..	2	..	2	..	..	..
Vermes	1	..	..	..	..	..	..	..	..	..

Appendix No. XV.—*continued.*

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations.					
					Barbadoes.		Demerara.		Trinidad.	
Strength	613		1,090		730		125		235	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
II. *Constitutional Diseases.*										
1. Diathetic Diseases:										
Anæmia	3	..	3	..	2	..	1	..	1	..
Anasarca	1	..	1	..	..	..	..	..	..	..
2. Tubercular Diseases:										
Scrofula	2	..	..	..	..	..	..	..	..	..
Phthisis Pulmonalis	5	1	7	2	4	1	1	..	2	1
Hæmoptysis	4	..	2	..	1	..	..	..	1	..
III. *Local Diseases.*										
1. Nervous System:										
Myelitis	1	..	..	..	..	..	..	..	..	..
Apoplexia	..	1	..	1	..	..	..	1	..	..
Delirium Tremens	2	..	5	2	2	..	2	2	1	..
Mania	1	..	1	..	..	..	..	..	1	..
Epilepsia	2	..	2	..	2	..	..	..	..	..
Cephalæa	5	..	3	..	1	..	1	..	1	..
Neuralgia	4	..	1	..	1	..	..	..	..	..
Otitis	2	..	11	..	5	..	..	..	6	..
Cæcitas	2	..	..	..	..	..	..	..	..	..
Hemeralopia	..	..	1	..	..	..	1	..	..	..
Polypus Nasi	..	..	1	..	1	..	..	..	..	..
2. Circulatory System:										
Hypertrophia Cordis	..	..	1	1	..	..	..	..	1	1
Degeneratio Cordis	..	..	1	..	1	..	..	..	..	..
Morbus Valv: Cordis	2	..	3	..	3	..	..	..	..	..
Palpitatio	..	..	4	..	4	..	..	..	..	..
Varix	1	..	3	..	2	..	..	..	1	..
Phlebitis	..	..	1	..	1	..	..	..	..	..
3. Respiratory System:										
Bronchitis Acuta	6	..	27	..	16	..	3	..	8	..
„ Chronica	6	..	6	..	4	..	1	..	1	..
Pleuritis	1	..	8	..	1	..	1	..	6	..
Pneumonia	1	..	2	..	2	..	..	..	..	..
Asthma	1	..	1	..	..	..	1	..	..	..
4. Digestive System:										
Gastritis	1	1	..	..	..	..	..	..	..	..
Obstipatio	3	..	10	..	3	..	..	..	7	..
Dyspepsia	18	..	28	..	21	..	2	..	5	..
Colica	..	..	10	..	9	..	1	..	..	..
Hernia	..	..	1	..	1	..	..	..	..	..
Hæmorrhois	5	..	11	..	5	..	2	..	4	..
Fistula in Ano	1	..	5	..	4	..	..	..	1	..
Hepatitis Acuta	1	..	2	..	2	..	..	..	..	..
„ Chronica	..	..	1	..	..	..	1	..	..	..
Ascites	..	..	1	1	..	..	..	..	1	1

Appendix No. XV.—*continued.*

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Demerara.		Trinidad.	
Strength	613		1,090		730		125		235	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
5. Urinary System:										
Ischuria	..	..	1	..	..	..	..	..	1	..
Lithiasis	1	..	..	..	..	..	..	..	..	..
Diabetes	2	1	..	..	..	..	..	..	..	..
Morbus Prostaticus	2	..	..	..	..	..	..	..	..	..
6. Reproductive System:										
Orchitis (not Gonorrhœal)	1	..	25	..	19	..	2	..	4	..
Fungus Testis	..	..	1	..	1	..	..	..	..	..
7. Locomotive System:										
Arthritis	2	..	1	..	..	..	..	..	1	..
Synovitis	1	..	2	..	2	..	..	..	..	..
Contractura	3	..	..	..	..	..	..	..	..	..
Periostitis	1	..	..	..	..	..	..	..	..	..
8. Integumentary System:										
Urticaria	2	..	..	..	..	..	..	..	..	..
Eczema	10	..	20	..	13	..	..	..	7	..
Herpes	..	..	1	..	1	..	..	..	..	..
Psoriasis	..	..	2	..	2	..	..	..	..	..
Lichen	1	..	1	..	1	..	..	..	..	..
Prurigo	..	..	1	..	..	..	..	..	1	..
Ecthyma	1	..	..	..	..	..	..	..	..	..
Roseola	1	..	..	..	..	..	..	..	..	..
Pityriasis	2	..	..	..	..	..	..	..	..	..
Phlegmon	47	..	87	..	55	..	15	..	17	..
Abscessus	6	..	28	..	4	..	7	..	17	..
Paronychia	7	..	9	..	7	..	2	..	..	..
Ulcus	64	..	47	..	22	..	11	..	14	..
IV. *Developmental Diseases.*										
1. Diseases of Nutrition:										
Atrophia	13	..	10	..	4	..	..	..	6	..
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Combustio	..	..	2	..	2	..	..	..	..	..
Explosio	..	..	1	..	..	..	..	..	1	..
Exsolatio	..	..	1	..	1	..	..	..	..	..
Submersio	1	..	..	..	..	..	..	..	..	..
Sectura	3	..	5	..	3	..	2	..	..	..
Contusio	62	1	55	..	41	..	4	..	10	..
Commotio	..	..	1	..	1	..	..	..	..	..
Sinus Sclopetarium	..	..	1	..	..	..	1	..	..	..
,, Incisum	29	..	33	..	23	..	4	..	6	..
Sectura	..	..	1	..	1	..	..	..	..	..
Luxatio	32	..	9	..	7	..	2	..	..	..
Fractura Pedis.	1	..	4	..	1	..	..	..	3	..

APPENDIX No. XV.—*continued.*

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations.					
					Barbadoes.		Demerara.		Trinidad.	
Strength	613		1,090		730		125		235	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Suicidal: Vulnus Incisum	..	..	1	1	1	..	..	..	..	1
6. Punitus	1	..	1	..	1	..	..	..	..	..
Total	755	5	1,644	15	1114	2	260	8	270	5

CAUSES of Deaths of the Invalids.

	Jamaica.	Windward and Leeward Command.
Phthisis Pulmonalis. ..	..	2

APPENDIX No. XVI.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Black Troops serving in the Windward and Leeward Command, Jamaica, Honduras, and Bahamas, in the Year 1864.

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Demerara.		Trinidad.		Honduras.		Bahamas.	
Average Strength.	616		677		508		122		25		260		448	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases*														
1. Miasmatic:														
Variola	15	3	..	..	..	..	..	..	..	..	..	..	..	..
Varioloides	3	..	..	..	..	..	..	..	..	..	..	..	..	..
Varicella	2	..	..	..	..	..	..	..	..	..	..	..	..	..
Tonsillitis	25	..	5	..	..	..	3	..	2	..	2	..	4	..
Influenza	7	..	1	..	..	..	..	..	1	..	..	..	..	..
Ophthalmia	11	..	15	..	13	..	2	..	..	..	4	..	6	..
Erysipelas	3	..	..	..	..	..	..	..	..	..	..	..	..	..
Furunculus	2	..	1	..	..	..	1	..	..	..	1	..	..	..
Dysenteria Acuta	7	..	10	..	10	..	..	..	..	..	..	..	1	1
„ Chron:	2	..	3	..	3	1	..	..	..	..	..	..	..	..
Diarrhœa	14	..	1	..	1	..	..	..	..	..	3	..	3	1
Cholera	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Febris Intermittens	13	..	19	1	12	1	7	..	..	..	25	..	4	..
„ Remittens	207	2	9	..	8	..	1	..	..	..	9	..	67	1
„ Continua	..	..	29	1	15	1	13	..	1	..	8	..	6	..
Rheumat: Acutus.	34	..	17	..	14	..	3	..	..	..	5	..	8	..
„ Chron:	22	..	24	..	11	..	11	..	2	..	6	..	8	..
Cynanche Trach:	..	..	1	..	1	..	..	..	..	..	..	..	..	..
Diphtheria	1	1	..	..	..	..	..	..	..	..	..	..	..	..
2. Enthetic:														
Syphilis Primaria.	80	..	117	..	101	..	16	..	..	..	16	..	15	..
„ Secundaria	10	..	6	..	4	..	2	..	..	..	1	..	9	1
Iritis Syphilitica	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Bubo	53	..	43	..	39	..	4	..	..	..	5	..	17	..
Gonorrhœa	96	..	85	..	75	..	10	..	..	..	6	..	12	..
Phymosis, &c.	..	..	4	..	4	..	..	..	..	..	1	..	..	..
Orchitis (Gon.)	5	..	6	..	5	..	1	..	..	..	..	..	1	..
Strictura Urethræ	2	..	2	..	2	..	..	..	..	..	1	..	..	..
Ulcus Penis	1	..	..	..	..	..	..	..	..	..	..	..	..	..
3. Dietic:														
Scorbutus	1	..	..	..	..	..	..	..	..	..	..	..	..	..
4. Parasitic:														
Scabies	2	..	1	..	1	..	1	..	..	..	2	..	4	..
Tænia Solium	..	..	2	..	..	..	1	..	1	..	1	..	..	..
Vermes	..	..	1	..	..	..	..	..	..	..	..	..	..	..
Dracunculus	..	..	6	..	6	..	..	..	..	..	..	..	..	..
II. *Constitutional Diseases.*														
1. Diathetic:														
Lumbago	..	..	..	..	..	..	..	..	..	..	..	..	2	..
Anæmia	..	..	2	..	..	..	2	..	..	..	..	..	17	..
Anasarca	5	..	4	..	3	..	1	..	..	..	..	..	..	..
Tumores	..	..	1	..	..	..	1	..	..	..	..	..	1	..

Appendix No. XVI.—*continued.*

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Demerara.		Trinidad.		Honduras.		Bahamas.	
Average Strength.	616		677		508		122		25		260		448	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Scirrhoma	..	..	1	..	1	..	..	..	..	..	..	..	..	..
Carcinoma	..	1	..	..	..	..	..	..	..	..	..	..	..	..
2. Tubercular:														
Scrofula	3	..	4	..	4	..	..	..	..	..	..	..	1	..
Phthisis Pulmon:	11	2	9	5	5	5	4	..	..	..	2	2	19	7
Hæmoptysis	5	1	4	..	3	..	1	..	..	..	..	..	..	..
Morbus Coxarius	..	..	..	..	..	..	..	..	..	..	..	..	1	..
III. *Local Diseases.*														
1. Nervous:														
Meningitis	..	..	..	..	..	..	..	..	..	..	1	1	..	..
Apoplexia	2	2	..	..	..	..	..	..	..	..	1	..	..	..
Paralysis	1	..	..	..	..	..	..	..	..	..	1	..	..	..
Delirium Tremens	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Mania	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Amentia	1	..	..	..	..	..	..	..	..	..	..	..	2	1
Epilepsia	3	..	..	..	..	..	..	..	..	..	1	..	2	..
Cephalæa	1	..	2	..	1	..	1	..	..	..	..	..	4	..
Neuralgia	2	..	..	..	..	..	..	..	..	..	..	..	1	..
Dysecœa	..	..	3	..	2	..	1	..	..	..	..	..	..	..
Otitis	4	..	3	..	1	..	2	..	..	..	..	..	..	..
Cataractes	2	..	..	..	..	..	..	..	..	..	..	..	..	..
2. Circulatory:														
Morb: Valv: Cord:	2	1	..	..	..	..	..	..	..	..	..	..	..	..
Angina Pectoris	..	..	1	..	1	..	..	..	..	..	..	..	1	..
Palpitatio	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Aneurisma Aortæ	..	..	..	1	..	..	..	1	..	..	..	..	..	..
3. Respiratory:														
Bronchitis Acuta	34	1	34	..	30	..	4	..	..	..	10	..	30	2
„ Chron:	6	..	5	1	5	1	..	..	..	..	2	1	6	..
Pleuritis	5	..	3	..	3	..	..	..	..	..	1	..	8	..
Pneumonia	3	1	5	2	5	2	..	..	..	..	..	..	3	1
Asthma	..	..	1	..	..	..	1	..	..	..	..	..	..	..
Epistaxis	..	..	2	..	2	..	..	..	..	..	..	..	..	..
4. Digestive:														
Gastritis	..	..	..	..	..	..	..	..	..	..	2	1	..	..
Obstipatio	3	..	2	..	..	..	..	..	2	..	1	..	..	..
Dyspepsia	2	..	2	..	..	..	..	..	2	..	1	..	7	..
Colica	1	..	1	..	1	..	..	..	..	..	2	..	1	..
Hæmatemesis	1	..	..	..	..	..	..	..	..	..	..	..	1	..
Hernia	6	..	3	..	3	..	..	..	..	..	3	..	1	..
Hæmorrhois	3	..	3	..	3	..	..	..	..	..	..	..	..	..
Splenitis	..	..	1	..	..	..	1	..	..	..	..	..	..	..
Hepatitis Acuta	..	..	5	1	4	1	1	..	..	..	2	..	1	..
„ Chronica	..	..	2	..	1	..	1	..	..	..	..	..	..	..
Icterus	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Ascites	2	1	..	..	..	..	..	..	..	..	..	..	2	..
5. Urinary:														
Nephritis	1	1	1	..	..	..	..	..	..	..	1	..	..	..
Nephria	..	..	..	1	..	..	1	1	..	..	..	..	..	..

Appendix No. XVI.—*continued.*

Stations	Jamaica.		Windward and Leeward Command.		Subordinate Stations. Barbadoes.		Demerara.		Trinidad.		Honduras.		Bahamas.	
Average Strength.	616		677		508		122		25		260		448	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Enuresis	3	..	..	..	..	..	..	..	..	..	..	..	..	..
Diabetes	1	..	..	..	..	..	..	..	..	..	..	..	..	..
6. Reproductive:														
Varicocele	2	..	..	..	..	..	..	..	..	..	..	..	..	..
Hydrocele	..	..	1	..	1	..	..	..	..	..	..	..	..	..
Orchitis (not Gon.)	6	..	9	..	8	..	1	..	..	..	2	..	7	..
7. Locomotive:														
Arthritis	2	..	..	..	..	..	..	..	..	..	..	..	..	..
Synovitis	2	..	..	..	..	..	..	..	..	..	..	..	2	..
Periostitis	3	..	..	..	..	..	..	..	..	..	..	..	..	..
Caries	1	..	1	..	..	..	1	..	..	..	..	..	..	..
8. Integumentary:														
Eczema	2	..	2	..	2	..	..	..	..	..	1	..	4	..
Herpes	..	..	..	..	..	..	..	..	..	..	1	..	..	..
Psoriasis	3	..	5	..	4	..	..	..	1	..	..	..	4	..
Mentagra	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Rupia	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Elephantiasis	..	..	1	..	1	..	..	..	..	..	..	..	..	..
Lepra	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Phlegmon	49	..	26	..	21	..	5	..	..	..	8	..	3	..
Abscessus	10	..	4	..	2	..	2	..	..	..	6	..	8	..
Paronychia	4	..	..	..	..	..	..	..	..	..	..	..	5	..
Ulcus	28	..	36	..	31	..	4	..	1	..	15	..	24	..
IV. *Developmental Diseases.* 4. Diseases of Nutrition:														
Atrophia	5	1	..	..	..	..	..	..	..	..	..	..	..	..
V. *Violent Deaths or Diseases.* 1. Accidental:														
Ambustio	..	..	..	1	..	..	..	1	..	..	..	..	2	..
Fractura	2	..	1	..	1	..	..	..	..	..	..	..	..	..
Contusio	14	..	13	..	9	..	4	..	..	..	3	..	4	..
Vulnus Incisum	7	..	15	..	6	..	9	..	..	..	13	..	14	..
Subluxatio	6	..	4	..	2	..	1	..	1	..	..	..	6	..
Vesiculæ Pedis	8	..	..	..	..	..	..	..	..	..	..	..	..	..
Venenatio	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Morsus Centipedis	..	..	1	..	..	..	..	..	1	..	..	..	..	..
3. Homicidal. Vulnus Incisum	1	1	..	..	..	..	..	..	..	..	..	..	..	..
4. Suicidal: Vulnus Incisum	..	1	..	..	..	..	..	..	..	..	1	..	..	..
5. Executio	..	1	..	..	..	..	..	..	..	..	..	..	..	..
6. Punitus	1	..	4	..	4	..	..	..	..	..	..	..	2	..
Total	893	21	635	14	495	12	125	3	15	..	177	5	365	16

APPENDIX No. XVII.

ABSTRACT, showing the Number of Men sent Home from the West Indies in 1864, the Number finally discharged the Service at the Invalid Depôt at Netley during the year, and the Number of Black Troops discharged as Invalids in the West Indies and Western Africa.

Diseases.	White Troops.				Black Troops.
	Sent home from		Discharged the Service at the Invalid Depôt in England from—		Discharged as Invalids, in the West Indies, Jamaica, and Western Africa.
	Windward and Leeward Command.	Jamaica.	Windward and Leeward Command.	Jamaica.	
I. *Zymotic Diseases.*					
1. Miasmatic:					
Ophthalmia	5	1	2	..	1
Dysenteria Chronica ..	1	..	..	1	..
Diarrhœa..	..	..	..	..	1
Febris Intermittens ..	1	1	..	..	..
„ Remittens ..	1	..	..	..	..
Rheumatismus Acutus ..	..	1	..	..	..
„ Chronicus	..	1	1	1	30
2. Enthetic:					
Syphilis Primaria ..	1	..	..	..	..
„ Secundaria ..	..	..	..	1	2
Strictura Urethræ ..	1	..	..	..	..
II. *Constitutional Diseases.*					
1. Diathetic:					
Anæmia	..	..	..	..	2
2. Tubercular:					
Scrofula	..	..	..	..	3
Phthisis Pulmonalis ..	2	5	3	4	7
Hæmoptysis	..	1	..	..	2
III. *Local Diseases.*					
1. Nervous:					
Paralysis..	..	..	..	..	1
Delirium Tremens ..	..	1	..	..	..
Mania	1	..	..	..	..
Epilepsia..	..	1	..	..	3
Otitis	..	..	..	..	1
Cataractes	..	..	..	..	1
Cæcitas	..	..	..	..	2
2. Circulatory:					
Morbus Valv: Cordis ..	1	1	1	..	..
Palpitatio	1	..	1	..	..
Aneurisma	1	..	1	..	..
Varix	2	..	3	..	..

Appendix No. XVII.—*continued.*

Diseases.	White Troops.				Black Troops.
	Sent Home from		Discharged the Service at the Invalid Depôt, from—		Discharged as Invalids, in the West Indies, Jamaica, and Western Africa.
	Windward and Leeward Command.	Jamaica.	Windward and Leeward Command.	Jamaica.	
3. Respiratory:					
Bronchitis Chronica ..	..	..	..	..	2
Pneumonia	..	1	..	..	2
4. Digestive:					
Dyspepsia	..	1	..	1	..
Hæmatemesis	..	..	..	..	1
Hernia	..	..	..	..	4
Fistula in ano	2	..	1	..	..
Hepatitis Chronica ..	..	..	..	..	3
5. Urinary:					
Morbus Prostaticus ..	..	1	..	..	.. 2
6. Reproductive:					
Hydrocele	..	..	..	..	
7. Locomotive:					
Periostitis	..	1	..	..	..
Necrosis	..	..	..	..	2
8. Integumentary:					
Eczema	..	..	..	..	1
Psoriasis	..	..	1	..	1
Frambœsia	..	..	..	..	1
Ulcus	..	..	..	..	2
IV. *Developmental Diseases.*					
4. Diseases of Nutrition					
Atrophia	..	1	..	1	2
Senectus	..	..	..	..	2
V. *Violent Deaths or Diseases.*					
1. Accidental:					
Fractura	..	..	1	..	1
Contusio	..	1	..	..	1
Vulnus Sclopetarium ..	..	..	..	..	10
,, Incisum	..	..	..	..	1
Subluxatio	..	1	1	..	1
Total	20	20	16	9	95

APPENDIX No. XVIII.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Black Troops serving in Western Africa, during the Year 1864.

Stations	Sierra Leone.		Gambia.		Gold Coast and Lagos.	
Strength	444		267		927	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*						
1. Miasmatic:						
Variola	1	..	..	..	2	1
Tonsillitis	2	..	5	..	11	..
Ophthalmia	3	..	6	..	23	..
Erysipelas	..	..	..	..	3	..
Furunculus	1	..	..	..	8	..
Dysenteria Acuta	2	..	7	..	210	32
„ Chronica	12	1	1	..	4	1
Diarrhœa	6	1	28	..	214	5
Febris Intermittens	44	..	34	..	618	3
„ Remittens	14	..	55	1	171	4
„ Continua	1	..	..	..	1	..
Rheumatismus Acutus	9	..	10	..	32	1
„ Chronica	19	..	14	..	47	2
Parotitis	..	..	..	..	2	..
2. Enthetic:						
Syphilis Primaria	22	..	33	..	89	..
„ Secundaria	5	..	1	..	10	..
Bubo	26	..	11	..	33	..
Gonorrhœa	88	..	50	..	61	..
Phymosis, &c.	..	..	1	..	5	..
Orchitis (Gonorrhœal)	4	..	2	..	13	..
3. Dietic:						
Scorbutus	..	..	..	..	5	..
Ebriositas	..	..	2	..	1	1
4. Parasitic:						
Scabies	5	..	..	..	24	..
Dracunculus	9	..	..	..	63	..
II. *Constitutional Diseases.*						
1. Diathetic:						
Lumbago	2	..	..	..	3	..
Anæmia	..	..	..	..	7	..
Anasarca	..	..	3	..	18	3
2. Tubercular:						
Scrofula	3	..	..	..	..	..
Phthisis Pulmonalis	2	2	2	..	8	4
Hæmoptysis	..	..	..	..	2	..
III. *Local Diseases.*						
1. Nervous:						
Meningitis	..	..	..	..	1	..
Apoplexia	..	..	..	..	1	2
Paralysis	1	..	..	..	..	..

Appendix No. XVIII.—*continued.*

Stations	Sierra Leone.		Gambia.		Gold Coast and Lagos.	
Strength	444		267		927	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Mania	..	..	..	..	1	..
Amentia	..	..	1	..	..	..
Epilepsia	1	..	1	..	11	..
Convulsio	1	..	..	..	..	..
Cephalæa	1	..	..	..	..	..
Neuralgia	..	..	..	..	4	..
Dysecœa	1	..	..	..	..	..
Otitis	..	..	1	..	8	..
2. Circulatory:						
Carditis	..	..	..	..	..	1
Hypertrophia Cordis	..	..	..	..	2	..
Morbus „	..	..	..	..	1	..
Aneurisma	..	..	..	..	1	1
3. Respiratory:						
Laryngitis	..	..	..	..	1	1
Bronchitis Acuta	3	..	20	1	112	8
„ Chronica	11	1	4	..	10	..
Pleuritis	7	..	5	..	13	..
Pneumonia	10	2	9	1	5	1
Apoplexia Pulmonalis	..	..	1	1	..	..
Asthma	3	..	..	..	..	..
4. Digestive:						
Gastritis	2	..	..	..	2	..
Enteritis	..	..	..	..	1	1
Obstipatio	..	..	..	..	4	..
Dyspepsia	1	..	1	..	4	..
Colica	5	..	4	..	11	..
Hæmatemesis	..	..	..	..	1	..
Hæmorrhois	1	..	3	..	1	..
Splenitis	2	..	..	..	1	..
Hepatitis Acuta	1	..	..	..	15	2
„ Chronica	1	1	..	..	2	..
Icterus	1	..	..	..	..	..
Cirrhosis	1	..	..	..	..	..
Ascites	..	..	..	1	1	..
5. Urinary:						
Nephritis	..	..	..	..	1	..
Nephria	2	1	2	..	..	..
Hæmaturia	..	..	4	..	..	..
Dysuria	..	..	1	..	..	..
Cystitis	..	..	..	..	2	..
6. Reproductive:						
Hydrocele	4	..	2	..	1	..
Orchitis (not Gonorrhœal)	14	..	13	..	10	..
7. Locomotive:						
Arthritis	1	..	..	..	3	..
Synovitis	3	..	..	..	..	..

Appendix No. XVIII.—*continued.*

Stations	Sierra Leone.		Gambia.		Gold Coast and Lagos.	
Strength	444		267		927	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Periostitis	..	..	2	..	..	..
Caries	2	..	..	..	..	..
Necrosis	..	..	..	..	1	..
8. Integumentary:						
Eczema	1	..	..	..	11	..
Herpes	1	..	..	..	..	..
Impetigo	1	..	..	..	..	..
Psoriasis	1	..	..	..	3	..
Lichen	..	..	..	..	1	..
Pemphigus	1	..	..	..	..	..
Acne	1	..	..	..	1	..
Ecthyma	..	..	..	..	1	..
Pityriasis	..	..	..	..	1	..
Phlegmon	20	..	20	..	32	..
Abscessus	14	..	9	..	22	..
Paronychia	1	..	2	..	2	..
Ulcus	48	..	18	..	122	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	1	1	2	..	2	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	1	..	..	..	1	..
Insolatio	..	..	..	..	2	..
Fractura	1	..	..	..	3	..
Contusio	13	1	7	..	30	..
Commotio	..	..	..	..	1	..
Vulnus Sclopetarium	..	..	1	..	2	..
„ Incisum	5	..	5	..	20	..
Luxatura	..	..	..	..	2	..
Subluxatio	..	..	2	..	3	..
Vesiculæ Pedis	..	..	1	..	8	..
Venenatio	..	..	..	..	..	1
3. Homicidal:						
Vulnus Incisum	..	..	..	..	..	1
4. Suicidal:						
Vulnus Sclopetarium	1	1	..	..	..	..
„ Incisum	..	..	1	1	..	..
5. Executio	..	..	..	..	..	1
6. Punitus	2	..	..	..	4	..
Not known	..	..	..	1	..	..
Total	473	12	407	7	2194	77

APPENDIX No. XIX.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Troops serving at St. Helena, the Cape of Good Hope, Mauritius, and Ceylon, in the year 1864.

Stations	St. Helena.		Cape of Good Hope.		Mauritius		Ceylon. White.		Ceylon. Black.	
Strength	531		4,123		1,789		867		1,417	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. Zymotic Diseases.										
1. Miasmatic:										
Variola	..	..	..	..	..	..	..	..	2	..
Varicella	..	..	2	..	..	..	..	..	1	..
Miliaria	..	..	1	..	..	..	..	..	..	..
Tonsillitis	5	..	60	..	18	..	17	..	5	..
Influenza	..	..	50	..	1	..	..	..	..	..
Ophthalmia	18	..	323	..	52	..	42	..	107	..
Erysipelas	..	..	11	..	3	..	2	..	1	..
Furunculus	8	..	38	..	17	..	20	..	23	..
Anthrax	..	..	1	..	1	..	..	..	..	..
Dysenteria Acuta	..	..	29	1	62	2	87	4	55	5
,, Chronica	1	..	12	2	20	1	60	3	1	..
Diarrhœa	25	..	70	..	53	..	101	1	53	..
Cholera	..	..	..	..	1	..	6	3	61	23
Febris Intermittens	..	..	4	..	3	..	70	..	589	..
,, Remittens	..	..	..	..	..	..	25	..	92	4
,, Typhoides	..	..	7	2	..	..	5	3	..	..
,, Continua	26	1	112	..	64	1	105	1	3	1
Rheumatismus Acutus	..	..	62	..	28	..	28	..	68	..
,, Chronicus	13	..	62	..	36	..	15	..	7	..
Parotitis	..	..	..	..	..	..	3	..	18	..
Pertussis	..	..	2	..	..	..	..	..	..	..
2. Enthetic:										
Syphilis Primaria	6	..	412	..	102	..	45	..	3	..
,, Secundaria	3	..	113	..	49	..	8	..	2	..
Iritis Syphilitica	..	..	4	..	2	..	2	..	1	..
Bubo	2	..	146	..	50	..	24	..	2	..
Gonorrhœa	36	..	497	..	124	..	27	..	13	..
Phymosis, &c.	..	..	9	..	3	..	3	..	..	..
Orchitis (Gonorrhœal)	1	..	60	..	3	..	3	..	..	..
Strictura Urethræ	3	..	18	..	9	..	2	..	1	..
Verrucæ	..	..	1	..	1	..	..	..	..	..
3. Dietic:										
Scorbutus	..	..	..	..	1	..	2	..	..	..
Purpura	..	..	2	..	..	..	..	..	..	..
Ebriositas	16	..	73	2	24	..	60	..	2	..
4. Parasitic:										
Porrigo	..	..	3	..	..	..	..	..	..	..
Scabies	3	..	12	..	1	..	8	..	62	..
Tænia Solium	..	..	8	..	8	..	3	..	..	..
Vermes	1	..	4	..	..	..	1	..	1	..
Dracunculus	..	..	..	..	..	..	..	..	1	..

Appendix No. XIX.—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius		Ceylon. White.		Ceylon. Black.	
Strength	531		4,123		1,789		867		1,417	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
II. *Constitutional Diseases.*										
1. Diathetic:										
Podagra	..	..	..	..	1	..	..	..	1	..
Lumbago	1	..	4	..	2	..	2	..	6	..
Anæmia	..	..	5	..	..	..	6	..	5	..
Anasarca	..	..	1	..	1	..	..	..	2	1
Tumores	1	..	6	..	..	..	..	..	..	..
Lupus	..	..	..	..	1	..	..	..	..	..
2. Tubercular:										
Scrofula	1	..	9	..	5	..	1	..	..	..
Phthisis Pulmonalis	3	..	23	6	13	4	5	2	2	2
Hæmoptysis	..	..	9	..	..	..	1	..	..	..
III. *Local Diseases.*										
1. Nervous:										
Encephalitis	..	..	..	..	..	..	1	..	..	..
Meningitis	..	..	1	..	1	1	1	1	..	..
Apoplexia	..	..	2	1	..	..	..	..	1	1
Paralysis	..	..	6	..	3	..	1	..	1	..
Delirium Tremens	1	..	15	1	8	1	10	1	1	..
Mania	..	..	3	..	2	..	1	..	..	..
Amentia	2	..	22	..	1	..	..	..	2	..
Epilepsia	1	..	12	1	..	..	4	..	..	..
Convulsio	..	..	1	..	..	..	..	..	1	..
Tetanus	..	..	2	..	..	..	..	..	..	..
Chorea	..	..	..	..	..	..	2	..	..	..
Cephalæa	..	..	12	..	8	..	4	..	5	..
Neuralgia	..	..	3	..	6	..	2	..	4	..
Odontalgia	..	..	1	..	..	..	..	..	..	..
Dysecœa	..	..	2	..	..	..	..	..	..	..
Otitis	7	..	17	..	4	..	15	..	6	..
Amaurosis	..	..	..	..	1	..	1	..	..	..
Dysopia	..	..	1	..	..	..	..	..	..	..
2. Circulatory:										
Carditis	..	..	..	..	..	..	..	..	1	..
Pericarditis	1	..	3	1	1	..	1	..	..	..
Hypertrophia cordis	4	..	..	..	2	1	9	..	..	..
Atrophia cordis	..	..	..	..	..	..	3	..	..	..
Morbus Valv: Cordis	2	..	33	3	9	1	16	1	3	3
Morbus Cordis	..	..	6	..	..	..	..	..	..	..
Aneurisma Aortæ	..	..	5	5	..	..	2	..	..	..
Varix	..	..	5	..	..	..	..	..	..	..
Angina Pectoris	..	..	1	..	..	..	..	..	..	..
Palpitatio	..	..	8	..	9	..	..	..	..	..
Ruptura Venæ Cavæ	..	..	..	1	..	..	..	..	..	..
3. Respiratory:										
Laryngitis	1	1	1	..	..	..	..	..	..	..
Bronchitis Acuta	..	..	62	..	36	..	57	..	58	2
" Chronica	3	..	21	..	18	..	19	1	7	..
Pleuritis	..	..	10	..	7	1	10	..	2	..
Pneumonia	..	..	12	1	3	..	1	1	2	..
Apoplexia Pulmonalis	1	1	..	1	1	1	..	1	..	..

Appendix No. XIX.—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius		Ceylon. White.		Ceylon. Black.	
Strength	531		4,123		1,789		867		1,417	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Asthma	6	..	2	..	..	..	..	..	20	..
Epistaxis	..	..	3	..	..	..	..	..	..	..
4. Digestive:										
Stomatitis	..	..	..	..	1	..	..	..	..	..
Pharyngitis	..	..	3	..	..	..	..	..	..	..
Enteritis	..	..	1	..	..	..	2	..	..	..
Peritonitis	..	..	1	..	..	..	1	..	..	..
Obstipatio	1	..	2	..	13	..	7	..	..	..
Dyspepsia	15	..	111	..	29	..	38	..	1	..
Colica	11	..	21	..	12	..	4	..	58	..
Hernia	..	..	3	..	1	..	..	..	1	..
Hæmorrhois	5	..	29	..	10	..	9	..	2	..
Fistula in ano	..	..	..	..	1	..	1	..	..	..
Splenitis	..	..	5	..	..	..	5	..	..	..
Hepatitis Acuta	..	..	7	1	15	2	35	2	11	1
„ Chronica	..	..	17	1	9	..	25	2	..	..
Congestio Hepatis	..	..	..	..	22	..	..	..	..	..
Cirrhosis	..	..	1	..	..	..	..	..	..	..
Icterus	1	..	5	..	4	..	3	..	..	..
Ascites	..	..	2	..	..	..	..	..	..	..
5. Urinary:										
Nephritis	..	..	..	..	1	1	4	..	1	..
Nephria	2	..	1	..	..	..	..	..	..	..
Ischuria	..	..	2	..	..	..	..	..	..	..
Hæmaturia	..	..	..	..	1	..	..	..	1	..
Cystitis	..	..	2	..	..	..	..	..	..	..
Fistula in Perineo	3	..	..	..	..	..	..	..	..	..
Enuresis	..	..	2	..	3	..	..	..	..	..
6. Reproductive:										
Varicocele	..	..	1	..	1	..	..	..	..	..
Hydrocele	..	..	10	..	4	..	..	..	..	..
Orchitis (not Gonorrhœal)	4	..	33	..	22	..	13	..	10	..
7. Locomotive:										
Arthritis	..	..	8	..	1	..	..	..	1	..
Synovitis	..	..	1	..	6	..	2	..	1	..
Periostitis	..	..	..	..	3	..	2	..	..	..
Caries	..	..	1	..	..	..	..	..	1	..
8. Integumentary System:										
Urticaria	..	..	2	..	1	..	..	..	..	..
Eczema	2	..	12	..	6	..	2	..	..	..
Herpes	2	..	..	..	7	..	3	..	1	..
Impetigo	..	..	3	..	..	..	..	..	..	..
Psoriasis	..	..	4	..	3	..	2	..	1	..
Lichen	..	..	2	..	..	..	1	..	..	..
Ecthyma	2	..	4	..	1	..	2	..	1	..
Rupia	..	..	..	..	1	..	..	..	..	..
Acne	..	..	1	..	..	..	..	..	1	..
Phlegmon	2	..	103	..	50	..	17	..	47	..
Abscessus	6	..	86	..	16	..	18	..	36	..
Paronychia	1	..	18	..	10	..	8	..	5	..
Ulcus	4	..	266	..	39	..	146	..	78	..

Appendix No. XIX.—*continued.*

Stations	St. Helena.		Cape of Good Hope.		Mauritius		Ceylon. White.		Ceylon. Black.	
Strength	531		4,123		1,789		867		1,417	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	..	..	4	..	18	..	16	..	2	1
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Ambustio	..	..	8	..	4	..	3	..	2	..
Explosio	1	..	..	..	..	..	..	..	1	..
Insolatio	..	..	2	..	..	..	1	..	..	..
Submersio	..	..	..	2	..	1	..	..	..	1
Fractura	4	..	23	2	5	..	1	..	2	..
Amputatio	..	..	5	..	..	..	..	..	1	..
Ruptura Renis	..	..	..	..	..	..	..	1	..	..
Contusio	29	..	191	1	43	..	58	..	44	..
Commotio	..	1	2	..	..	..	..	..	..	..
Vulnus Sclopetarium	..	..	5	..	1	..	1	..	3	..
„ Incisum	28	..	72	..	20	..	31	..	42	..
Luxatura	..	..	3	..	1	..	4	..	2	..
Subluxatio	10	..	48	..	15	..	21	..	19	..
Vesiculæ Pedis	7	..	13	..	8	..	37	..	..	..
Morsus Scorpionis	1	..	..	..	..	..	..	..	..	..
„ Serpentis	..	..	2	..	..	..	1	..	..	..
„ Canis	..	..	..	..	..	..	..	..	1	..
4. Suicidal:										
Vulnus Sclopetarium	..	..	..	..	..	..	..	1	..	..
Suspendium	..	..	..	..	..	..	..	..	..	1
5. Executio	..	..	..	..	..	..	..	..	..	..
6. Punitus	1	..	11	..	3	..	6	..	1	..
Simulatio Morbi	..	..	2	..	..	..	..	..	..	..
No appreciable disease	2	..	..	..	..	..	..	..	..	..
Total	346	4	3698	35	1290	18	1479	29	1682	46

CAUSES of the Deaths of the Invalids.

	St. Helena.	Cape.	Mauritius.	Ceylon. White.
Phthisis Pulmonalis	..	1	1	1
Aneurisma Aortæ	..	1	..	..
Hepatitis Chronica	..	..	2	..
Total	..	1	3	1

APPENDIX No. XX.

ABSTRACT, showing the Number of Men sent home from St. Helena, the Cape of Good Hope, Mauritius, and Ceylon, in 1864, as Invalids, and of Invalids finally discharged the Service in these Colonies and in England.

Diseases.	Sent Home from—				Discharged in the Colony.		Discharged at Home from—			
	St. Helena.	Cape of Good Hope.	Mauritius.	Ceylon.	Cape of Good Hope.	Ceylon, Black Troops.	St. Helena.	Cape of Good Hope.	Mauritius.	Ceylon.
I. *Zymotic Diseases.*										
1. Miasmatic:										
Ophthalmia	2	39	84	..	..	1	1		17	18
Dysenteria Acuta	..	1	3	..	..	..	..	24	..	..
„ Chronica	..	..	..	25	..	..	..	..	1	1
Diarrhœa	1	..	..	..	..	..	..	1	..	..
Febris Intermittens	..	..	..	..	..	..	..	..	..	..
Rheumatismus Chronicus	1	12	4	..	10	5	..	1	1	1
								6		
2. Enthetic:										
Syphilis Secundaria	..	10	1	..	1	..	..	..	..	1
Iritis Syphilitica	..	..	..	..	..	1	..	2	..	..
Bubo	..	..	..	..	..	..	..	..	..	1
Orchitis (Gonorrhœal)	..	1	..	..	..	..	..	..	..	..
Strictura Urethræ	..	..	1	1	..	..	..	..	1	..
								..		
3. Dietic Diseases:										
Purpura	..	..	1	..	..	..	..		..	..
								..		
II. *Constitutional Diseases.*										
1. Diathetic Diseases:										
Anæmia	..	..	..	1	..	..	..		4	..
								1		
2. Tubercular Diseases:										
Scrofula	..	5	4	1	..	..	..		1	..
Phthisis Pulmonalis	2	10	13	4	3	..	2	..	8	3
Hæmoptysis	1	..	..	..	..	..	..	5	..	..
								..		
III. *Local Diseases.*										
1. Of the Nervous Syst.:										
Encephalitis	..	..	..	1	..	..	..		..	..
Paralysis	..	6	2	1	..	..	..	..	1	..
Mania	..	2	..	..	..	..	..	4	..	..
Amentia	6	3	..	..	..	..	..	..	..	..
Epilepsia	..	5	..	3	..	..	..	..	..	1
Dysecœa	..	..	1	2	..	..	..	4	..	1
Otitis	1	1	..	..	..	..	..	1	..	..
Amaurosis	..	3	..	1	..	..	..	..	..	1
								1		
2. Circulatory System:										
Pericarditis	..	..	4	..	..	..	..		..	..
Hypertrophia Cordis	..	..	2	1	..	..	..	..	2	..
Atrophia „	..	..	..	2	..	..	..	1	..	..
Morbus Valv:	1	13	2	1	6	..	..	..	5	..
Morbus „	..	1	..	..	..	..	..	11	..	..
Palpitatio	..	..	1	..	..	..	..	..	..	..
Aneurisma Aortæ	..	..	..	1	..	..	..	..	..	..
Aneurisma	..	..	..	..	..	..	..	..	..	1
								..		

APPENDIX No. XX.—*continued.*

Diseases.	Sent Home from—				Discharged in the Colony.		Discharged at Home from—			
	St. Helena.	Cape of Good Hope.	Mauritius.	Ceylon.	Cape of Good Hope.	Ceylon, Black Troops.	St. Helena.	Cape of Good Hope.	Mauritius.	Ceylon.
Varix	..	1	..	..	..	..	..	..	1	..
Angina Pectoris	..	..	..	1	..	..	..	..	..	..
3. Respiratory System:										
Bronchitis Chronica ..	..	2	..	2	..	..	..	..	..	1
Pleuritis	..	1	1	..	..	..	..	1	..	..
Pneumonia	..	..	..	..	1	..	..	1	..	..
Asthma	2	..	..	..	..	1	..	..	..	..
4. Of the Digestive Syst.:										
Dyspepsia	3	2	..	..	..	..	1	..	..	1
Hernia	..	2	2	..	3	1	..	2	2	..
Splenitis	..	..	..	1	..	..	..	1	..	..
Hepatitis Chronica ..	..	4	2	8	..	..	1	1	1	6
5. Of the Urinary Syst:										
Nephritis	..	..	..	..	..	..	..	..	1	..
Nephria	1	..	1	..	..	..	..	..	..	..
Fistula in Perineo	1	..	..	..	..	..	..	..	..	..
Enuresis	..	1	2	..	..	..	..	..	2	..
6. Of the Reproductive System:										
Varicocele	..	1	1	..	..	..	..	..	..	..
Orchitis (not Gonorrhœal)	..	..	..	..	..	..	..	..	..	1
7. Of the Locomotive Syst.										
Arthritis	..	..	..	..	..	..	..	2	..	..
Synovitis	..	1	..	..	..	..	..	1	..	..
Contractura	..	1	1	1	..	..	..	2	3	..
Periostitis	..	1	..	..	..	..	..	1	..	..
Caries	..	..	1	..	..	..	..	..	..	..
8. Of the Integumentary System:										
Eczema	..	1	..	..	..	..	..	..	..	..
Ecthyma	1	..	..	..	..	..	..	..	..	..
Ulcus	..	2	..	..	..	..	..	2	..	..
IV. *Developmental Diseases.*										
4. Diseases of Nutrition:										
Atrophia	..	10	5	..	1	..	..	9	2	4
V. *Violent Deaths or Diseases.*										
1. Accidental:										
Fractura	..	1	..	..	..	..	..	..	..	1
Contusio	..	1	..	..	..	..	..	..	..	..
Vulnus Sclopetarium ..	..	..	1	..	..	..	..	..	..	..
Luxatura	..	2	..	1	..	..	..	..	..	..
Subluxatio	1	..	..	..	..	..	1	..	..	..
"Worn out"	..	3	..	..	..	..	..	..	..	..
Diseases not specified ..	..	2	..	..	..	..	..	..	..	..
Total	24	151	140	59	25	9	6	85	53	43

APPENDIX No. XXI.

ABSTRACT, showing the Ages of the Troops serving at the Cape of Good Hope, and the Deaths at each Age, during the Year 1864.

	Under 20 Years.		20-24.		25-29.		30-34.		35-39.		40 and upwards.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery ..	2	..	19	..	45	..	43	..	28	..	3	..	140	..
Royal Engineers ..	4	..	13	..	102	..	39	..	13	..	4	..	175	..
2nd Batt. 5th Foot ..	159	..	267	..	288	3	34	1	39	..	..	..	787	4
2nd „ 10th „ ..	28	..	522	3	154	5	69	2	17	..	4	..	794	10
2nd „ 11th „ ..	22	..	450	1	204	3	121	3	12	2	2	1	811	10
96th Foot	28	..	265	..	303	3	130	2	45	..	6	..	777	5
Cape Mounted Rifles	235	..	151	2	139	..	120	1	39	2	6	1	690	6
Total	478	..	1,687	6	1,235	14	556	9	193	4	25	2	4,174	35

APPENDIX No. XXII.

ABSTRACT, showing the Ages of the Troops serving at the Mauritius, and the Deaths at each Age, during the Year 1864.

Age on 1st January {	Under 20.		20–24.		25–29.		30–34.		35–39.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery ..	..	..	39	..	94	4	70	3	15	..	6	..
Royal Engineers ..	4	..	13	..	95	..	38	..	10	..	1	..
2nd Bat. 13th Foot..	13	..	378	2	254	2	95	2	18	1	1	1
2nd „ 24th „ ..	7	..	485	4	179	1	67	1	11	..	..	..
Total	24	..	915	6	622	7	270	6	54	1	8	1

APPENDIX No. XXIII.

ABSTRACT, showing the Ages of the Troops serving in Ceylon, and the Deaths at each Age, during the Year 1864.

Age. .. .. {	Under 20 Years.		20-24.		25-29.		30-34.		35-39.		40 and upwards.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery	1	..	4	..	60	3	19	2	6	..	..	..	90	5
2nd Battalion, 25th Foot .	120	2	464	12	134	5	74	4	12	1	..	..	804	24
Total	121	2	468	12	194	8	93	6	18	1	..	..	894	29
Gun Lascars	12	1	43	2	47	2	30	1	23	..	22	1	177	7
Ceylon Rifles	245	6	295	6	194	10	196	10	191	5	84	2	1,205	39
Total	257	7	338	8	241	12	226	11	214	5	106	3	1,382	46

APPENDIX No. XXIV.

ABSTRACT, showing the Admissions into Hospital and Deaths among the Troops serving in Australia, New Zealand, and China, during the year 1864.

Stations	Australia.		New Zealand.		China. White.		China. Black.		Japan.	
Strength	367		9,468		2,101		1,553		528	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*										
1. Miasmatic:										
Variola	..	..	..	..	8	3	..	..	17	2
Varioloides	..	..	..	..	..	..	1	..	..	..
Varicella	..	..	..	..	..	..	2	..	..	..
Scarlatina	1	..	4	1	..	..	..	..	..	..
Tonsillitis	2	..	121	..	46	..	..	..	23	..
Influenza	..	..	73	..	5	..	8	..	1	..
Ophthalmia	6	..	379	..	65	..	16	..	19	..
Erysipelas	1	..	22	..	1	..	2	..	..	..
Furunculus	7	..	69	..	30	..	18	..	6	..
Anthrax	..	..	10	..	..	..	..	..	..	..
Dysenteria Acuta	1	..	346	12	89	5	45	..	..	..
„ Chronica.	..	..	40	2	45	5	1	..	..	..
Diarrhœa	11	..	481	9	378	7	122	5	75	4
Cholera Spasmodica	..	..	..	..	35	17	1	1	13	11
„ Biliosa	..	..	4	1	..	..	11	5	..	..
Febris Intermittens	2	..	39	..	907	..	658	2	108	..
„ Remittens	2	..	6	1	60	5	1	..	17	..
„ Typhoides	..	..	33	7	..	..	4	3	..	..
„ Typhus	..	..	5	..	..	..	..	..	..	..
„ Continua	8	..	593	16	701	4	21	1	119	2
Rheumat: Acutus	4	..	181	..	30	..	14	..	11	..
„ Chronicus	7	..	192	..	53	..	128	..	19	..
Parotitis	..	..	3	..	..	..	3	..	2	..
2. Enthetic:										
Syphilis Primaria	13	..	27	..	210	..	61	..	89	..
„ Secundaria	8	..	112	..	54	..	11	1	13	..
Cachexia Syphiloidæ	..	..	..	..	1	..	..	..	..	..
Iritis Syphilitica	..	..	3	..	2	..	..	..	..	..
Bubo	1	..	10	..	37	..	29	..	22	..
Gonorrhœa	20	..	54	..	152	..	78	..	46	..
Phymosis, &c.	..	..	2	..	5	..	1	..	..	..
Orchitis (Gonorr:)	..	..	3	..	32	..	10	..	12	..
Strictura Urethræ	1	..	20	..	2	..	..	..	..	..
Verrucæ	..	..	7	..	1	..	..	..	..	..
3. Dietic:										
Scorbutus	..	..	4	..	1	..	..	..	..	..
Purpura	..	..	2	..	1	..	..	..	..	..
Ebriositas	16	..	122	1	105	..	2	..	8	..
4. Parasitic:										
Porrigo	1	..	15	..	..	..	..	..	1	..
Scabies	3	..	187	..	16	..	26	..	3	..
Tænia Solium	..	..	5	..	4	..	..	..	..	..
Vermes	..	..	..	..	7	..	..	..	4	..
Dracunculus	..	..	..	..	..	..	3	..	..	..

Appendix No. XXIV.—*continued.*

Stations	Australia.		New Zealand.		China.				Japan.	
					White.		Black.			
Strength	367		9,468		2,101		1,553		528	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Ascaris Lumbricoides	..	..	1	..	..	..	..	..	..	..
Acephalocystis	..	..	1	..	..	..	..	..	..	..
Phthiriasis	..	..	1	..	..	..	..	..	..	..
II. *Constitutional Diseases.*										
1. Diathetic:										
Podagra	..	..	..	..	..	..	2	..	..	..
Lumbago	13	..	29	..	5	..	7	..	..	..
Ischias	..	..	2	..	..	..	1	..	..	..
Anæmia	..	..	5	..	2	..	..	..	..	..
Anasarca	1	..	25	..	4	1	..	..	..	..
Beri-beri	..	..	..	..	..	..	2	1	..	..
Tumores	1	..	10	..	..	..	..	..	..	..
Scirrhoma	..	..	1	1	..	..	..	..	..	..
2. Tubercular:										
Scrofula	..	..	21	..	6	..	4	1	2	..
Phthisis Pulmonalis	1	1	61	11	28	3	4	2	..	..
Hæmoptysis	..	..	9	2	5	..	1	..	1	..
III. *Local Diseases.*										
1. Nervous Syst.:										
Encephalitis	..	..	2	1	1	1	..	..	..	..
Meningitis	..	..	2	1	..	..	..	..	..	..
Apoplexia	..	..	2	5	1	3	..	..	..	..
Paralysis	..	..	6	..	5	..	3	..	..	..
Delirium Tremens	3	..	20	1	23	3	..	..	..	..
Mania	..	..	6	..	3	..	1	..	..	..
Amentia	3	..	10	..	..	..	2	..	..	..
Epilepsia	13	..	51	..	13	..	4	..	1	..
Tetanus	..	..	..	..	2	..	..	..	..	..
Cephalæa	2	..	22	..	12	..	3	..	..	..
Neuralgia	13	..	36	..	9	..	2	..	1	..
Odontalgia	..	..	1	..	..	..	1	..	..	..
Dysecœa	..	..	10	..	3	..	..	..	..	..
Otitis	..	..	30	..	14	..	8	..	4	..
Cæcitas	..	..	1	..	4	..	2	..	..	..
Cataractes	..	..	1	..	..	..	..	..	..	..
Hemeralopia	..	..	1	..	..	..	..	..	..	..
Iritis	..	..	1	..	..	..	..	..	..	..
2. Circulatory Syst.:										
Pericarditis	..	..	8	1	..	..	..	..	..	..
Hypertrophia cordis	4	..	16	..	5	..	..	..	..	..
Degeneratio „	..	..	..	1	..	..	..	..	..	..
Morbus Valv: „	..	..	38	5	1	1	..	..	1	..
Aneurisma Aortæ	..	..	6	5	2	..	..	..	..	..
Aneurisma	..	..	..	..	1	1	2	1	..	..
Varix	1	..	21	..	..	..	..	..	..	..
Palpitatio	..	..	3	..	4	..	..	..	..	..
Angina Pectoris	..	..	1	1	..	..	..	..	..	..
Phlebitis	..	..	4	2	..	..	..	..	..	..

Appendix No. XXIV.—*continued.*

Stations	Australia.		New Zealand.		China.				Japan.	
					White.		Black.			
Strength	367		9,468		2,101		1,553		528	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
3. Respiratory Syst.:										
Laryngitis	..	..	3	..	1	1	2	..	..	..
Tracheitis	..	..	1	..	..	..	..	..	..	..
Bronchitis Acuta ..	4	..	342	1	50	..	51	7	23	..
„ Chronica	4	..	69	1	53	..	29	2	..	..
Pleuritis	..	..	34	..	5	..	..	..	2	..
Pneumonia	..	..	26	9	6	..	9	..	1	..
Apoplexia Pulm: ..	..	..	..	..	..	1	..	..	1	3
Asthma	..	..	4	..	1	..	15	..	..	..
Epistaxis	..	..	3	..	..	..	..	..	..	..
Pleurodynia ..	..	..	2	..	..	..	..	..	..	..
4. Digestive Syst.:										
Gastritis	..	..	5	..	..	..	..	..	..	..
Pharyngitis	..	..	..	..	2	..	3	..	..	..
Enteritis	..	..	2	..	..	..	2	..	..	..
Peritonitis	..	..	3	2	..	..	1	1	..	..
Obstipatio	..	..	30	..	8	..	..	..	4	..
Dyspepsia	7	..	119	..	33	..	17	..	1	..
Colica	2	..	42	1	39	..	17	..	2	..
Hæmatemesis ..	..	..	2	..	..	..	..	..	..	..
Hernia	2	..	9	..	6	..	..	..	2	..
Hæmorrhois ..	4	..	38	..	14	..	9	..	2	..
Fistula in Ano ..	..	..	9	..	1	..	..	..	..	..
Splenitis	..	..	2	..	5	..	4	..	..	..
Hepatitis Acuta ..	..	..	21	3	27	2	6	..	1	..
„ Chronica	..	..	46	..	53	4	..	..	4	..
Icterus	1	..	12	1	7	..	1	..	..	..
Ascites	..	..	8	1	1	1	1	..	..	..
Prolapsus Ani ..	..	..	..	..	..	..	1	..	..	..
Stomatitis	..	..	1	..	..	..	1	..	..	..
Chololithus	..	..	1	..	..	..	..	..	..	..
Gastrodynia ..	..	..	1	..	..	..	..	..	..	..
Melæna	..	..	1	..	..	..	..	..	..	..
5. Urinary Syst.:										
Nephritis	..	1	5	..	3	..	..	..	..	..
Nephria	..	..	9	..	1	..	..	..	1	..
Ischuria	..	..	2	2	..	..	..	..	..	..
Lithiasis	..	..	2	..	..	..	..	..	..	..
Cystitis	..	..	3	..	3	..	1	..	..	..
Fistula in Perineo ..	..	..	3	..	1	..	..	..	..	..
Enuresis	..	..	2	..	..	..	..	..	..	..
Morbus Prostaticus	..	..	..	..	..	..	2	..	..	..
6. Reproductive System:										
Varicocele	..	..	2	..	1	..	..	..	..	..
Hydrocele	2	..	8	..	1	..	1	..	..	..
Orchitis (not Gon:) ..	1	..	52	..	29	..	6	..	..	..
Fungus Testis ..	..	..	..	..	1	..	..	..	..	..
7. Locomotive Syst:										
Arthritis	1	..	4	..	..	..	..	..	..	..

Appendix No. XXIV.—*continued.*

Stations	Australia.		New Zealand.		China. White.		China. Black.		Japan.	
Strength	367		9,468		2,101		1,553		528	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Synovitis	..	..	17	..	2	..	..	..	..	..
Contractura	..	..	5	..	1	..	..	..	..	..
Periostitis	..	..	11	..	2	..	3	..	2	..
Exostosis	..	..	..	..	..	..	..	..	2	..
Caries	..	..	1	..	..	..	3	..	..	..
Necrosis	..	..	2	..	..	..	..	..	..	..
Atrophia Muscul:	..	..	1	..	..	..	..	..	..	..
8. Integumentary System:										
Urticaria	..	..	2	..	2	..	..	..	..	..
Eczema	4	..	21	..	7	..	2	..	6	..
Herpes	..	..	21	..	5	..	1	..	1	..
Impetigo	..	..	21	..	..	..	..	..	..	..
Psoriasis	..	..	18	..	6	..	1	..	..	..
Lichen	1	..	1	..	1	..	..	..	..	..
Rupia	..	..	2	..	2	..	..	..	..	..
Pemphigus	..	..	..	..	1	..	..	..	..	..
Lepra	..	..	4	..	..	..	1	..	..	..
Pernio	..	..	1	..	..	..	1	..	..	..
Pityriasis	..	..	6	..	..	..	1	..	..	..
Acne	..	..	1	..	..	..	..	..	4	..
Mentagra	..	..	3	..	..	..	..	..	..	..
Phlegmon	9	..	232	..	130	..	11	..	62	..
Abscessus	2	..	74	..	12	..	2	..	3	..
Paronychia	..	..	35	..	8	..	12	..	1	..
Ulcus	4	..	337	..	78	..	8	..	49	..
IV. *Developmental Diseases.* 4. Diseases of Nutrition:										
Atrophia	..	..	16	..	45	3	71	7	1	..
V. *Violent Deaths or Diseases.* 1. Accidental:										
Ambustio	2	..	37	..	3	..	2	..	3	..
Explosio	1	..	3	..	..	..	..	..	..	..
Insolatio	..	..	5	3	10	4	2	..	..	..
Submersio	..	1	1	23	..	4	..	..	..	1
Asphyxia	..	..	..	1	..	..	..	..	..	2
Fractura	2	..	68	5	14	..	..	..	2	1
Suffocatio	..	..	1	..	..	..	..	..	..	..
Amputatio	..	..	3	..	..	..	..	..	..	..
Contusio	25	..	332	..	75	..	25	..	20	..
Commotio	..	..	1	..	..	1	..	..	..	..
Vulnus Sclopetarium	1	..	17	2	3	..	..	..	1	..
„ Incisum	8	..	163	..	59	..	14	..	36	..
Luxatura	1	..	15	..	3	..	2	..	..	..
Subluxatio	7	..	214	..	47	..	14	..	19	..
Vesiculæ Pedis	1	..	36	..	6	..	..	..	6	..

Appendix No. XXIV.—*continued.*

Stations	Australia.		New Zealand.		China.				Japan.	
					White.		Black.			
Strength	367		9,468		2,101		1,553		528	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Venenatio	..	..	1	..	..	..	..	..	..	..
Morsus Canis ..	..	..	2	..	..	..	..	..	..	..
2. In Battle:										
Amputatio	..	..	6	..	..	..	..	..	..	..
Vulnus Incisum ..	..	..	1	..	..	..	1	..	..	..
„ Sclopetarium	..	..	222	61	..	..	..	..	..	..
Resectio	..	..	1	..	..	..	..	..	..	..
Contusio	..	..	1	..	..	..	..	..	..	..
Deligatio Art: Fem:	..	..	1	..	..	..	..	..	..	..
3. Homicidal:										
Vulnus Sclopetarium	..	..	3	1	..	1	..	..	..	..
„ Incisum ..	..	..	..	..	..	3	..	..	..	..
4. Suicidal:										
Vulnus Sclopetarium	..	1	1	2	..	..	..	..	..	..
Venenatio	..	..	1	..	..	..	..	..	..	..
6. Punitus ..	2	..	290	..	6	..	1	..	1	..
Disease not stated ..	..	..	..	..	1	..	..	..	..	..
No appreciable disease ..	..	..	..	..	2	..	..	..	..	..
Total ..	268	4	6,825	206	4,119	84	1,683	40	901	26

CAUSES of the Deaths of the Invalids.

	Australia.	New Zealand.	China.
Febris Intermittens	..	1	1
Dysenteria Chronica	..	2	5
Anasarca	..	..	1
Phthisis Pulmonalis	1	3	1
Paralysis	..	1	..
Morbus Cordis	..	1	..
Pneumonia	..	1	1
Splenitis	..	1	..
Hæmaturia	..	1	..
Ulcus	..	1	..
Total	1	12	9

APPENDIX No. XXV.

ABSTRACT, showing the Number of Men sent home as Invalids from Australia, New Zealand, and China, in 1864, and the Number discharged the Service as Invalids in Australasia and in England.

Stations	Australia.		New Zealand.			China.		
				Discharged the Service—		White Troops.		Asiatic Troops.
Diseases.	Sent Home as Invalids.	Discharged the Service in Colony.	Sent Home as Invalids.	In Colony.	In England.	Sent Home.	Discharged in England.	Sent to India.
I. Zymotic Diseases.								
1. Miasmatic:								
Ophthalmia	..	1	22	2	18	5	5	1
Dysenteria Acuta	..	..	..	..	..	2	..	..
„ Chronica	..	..	5	..	..	21	3	..
Diarrhœa	..	..	2	..	..	3	3	1
Febris Intermittens	..	..	1	..	..	12	3	2
„ Remittens	..	..	..	..	..	3	1	..
„ Continua	..	..	..	..	..	2	..	..
Rheumatismus Acutus	..	..	1	..	..	..	..	..
„ Chron:	1	3	18	4	5	4	2	3
2. Enthetic:								
Syphilis Secundaria	..	..	3	..	..	4	..	..
Cachexia Syphiloidea	..	..	..	..	..	3	..	..
Iritis Syphilitica	..	..	1	..	..	..	1	..
Orchitis (Gonorrhœal)	..	..	4	..	..	..	..	..
Strictura Urethræ	..	..	..	..	2	..	..	..
3. Dietic:								
Scorbutus	..	..	1	..	..	..	..	..
4. Parasitic:								
Acephalocystis	..	..	1	..	..	..	..	..
II. Constitutional Diseases.								
1. Diathetic:								
Lumbago	1	..	..	..	..	..	..	..
Anæmia	..	..	..	..	..	1	3	9
Anasarca	..	..	1	..	..	..	..	..
Tumores	..	..	..	1	..	..	..	..
2. Tubercular:								
Scrofula	..	1	9	..	4	1	1	2
Phthisis Pulmonalis	..	2	26	3	20	8	11	..
Hæmoptysis	..	..	1	..	..	1	..	..
III. Local Diseases.								
1. Nervous:								
Paralysis	..	..	1	1	2	3	1	..
Mania	..	1	3	..	..	..	..	..
Amentia	1	..	3	..	..	..	..	..
Epilepsia	..	..	7	1	4	3	2	..

APPENDIX No. XXV.—*continued.*

Stations	Australia.		New Zealand.			China.		
Diseases.	Sent Home as Invalids.	Discharged the Service in Colony.	Sent Home as Invalids.	Discharged the Service— In Colony.	Discharged the Service— In England.	White Troops. Sent Home.	White Troops. Discharged in England.	Asiatic Troops. Sent to India.
Cephalæa	..	..	1	..	..	..	..	..
Neuralgia	1	..	..	..	..	..	..	..
Dysecœa	..	..	1	..	2	..	..	..
Amaurosis	..	..	..	..	1	..	..	..
Cæcitas	..	..	..	..	..	..	5	1
2. Circulatory:								
Hypertrophia Cordis	..	3	4	..	3	1	1	..
Morbus Valv: Cordis	..	..	5	1	4	1	1	..
Aneurisma Aortæ	..	..	1	..	..	..	..	..
Aneurisma	..	..	..	..	2	..	..	..
Varix	..	3	1	5	3	..	..	..
Palpitatio	..	..	..	..	..	1	..	..
3. Respiratory:								
Bronchitis Acuta	..	..	..	..	..	8	..	..
„ Chronica	..	1	10	4	7	..	10	..
Pneumonia	..	..	..	..	..	1	..	..
Asthma	..	..	1	..	..	1	..	5
4. Digestive:								
Dyspepsia	..	1	..	..	..	..	..	..
Splenitis	..	..	2	..	..	..	..	..
Hepatitis Chronica	..	..	3	2	1	3	2	..
5. Urinary:								
Nephria	..	..	1	..	..	1	..	..
Hæmaturia	..	1	..	..	..	..	..	..
Cystitis	..	..	..	..	1	..	..	..
Enuresis	..	..	..	..	..	..	1	..
6. Reproductive:								
Hydrocele	..	..	..	..	1	..	..	..
Orchitis (not Gonorrhœal) ..	..	..	..	..	..	1	1	..
7. Locomotive:								
Arthritis	..	..	..	..	..	..	1	..
Synovitis	..	..	..	1	2	1	..	..
Contractura	..	..	..	..	1	..	1	..
Periostitis	..	..	..	1	..	..	..	1
Caries	..	..	1	..	1	..	..	..
Atrophia Musculorum	..	..	..	..	1	..	1	..
8. Integumentary:								
Psoriasis	..	..	..	..	..	1	..	..
Abscessus	..	1	2	1	1	..	..	..
Ulcus	..	..	2	2	..	..	..	..
IV. *Developmental Diseases.*								
4. Diseases of Nutrition:								
Atrophia	..	..	3	..	13	10	3	21
Debilitas	..	..	..	..	..	..	4	..

Appendix No. XXV.—*continued.*

Stations	Australia.		New Zealand.			China.		
Diseases.	Sent Home as Invalids.	Discharged the Service in Colony.	Sent Home as Invalids.	Discharged the Service— In Colony.	Discharged the Service— In England.	White Troops. Sent Home.	White Troops. Discharged in England.	Asiatic Troops. Sent to India.
V. *Violent Deaths or Diseases.*								
1. Accidental:								
Fractura	..	..	3	5	..	1	..	..
Commotio	..	..	1	..	..	..	..	..
Vulnus Sclopetarium	..	..	2	2	..	1	..	..
„ Incisum	..	..	2	..	2	..	..	..
Luxatura	..	..	..	2	..	1	..	..
Subluxatio	..	1	..	..	1	..	..	..
2. In Battle:								
Vulnus Sclopetarium	..	..	50	10	26	..	..	..
Amputatio	..	..	3	..	..	..	..	..
Resectio	..	..	5	..	..	..	..	..
Total	4	19	214	48	128	109	67	46

APPENDIX No. XXVI.

ABSTRACT, showing the Ages of the Men serving in Australasia, and the Deaths in each Quinquennial Period of Life, during the Year 1864.

	Under 20.		20–24.		25–29.		30–34.		35–39.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Royal Artillery ..	11	..	197	4	160	..	87	4	55	1	39	..
Royal Engineers..	2	..	30	..	37	..	10	..	9	..	3	..
4th Bat. Mil. Train	2	1	73	2	159	2	47	1	5	..	3	..
1st „ 12th Foot	150	1	180	3	171	8	61	2	45	1	15	..
2nd „ 14th „	37	..	238	2	277	4	462	2	102	..	3	1
2nd „ 18th „	234	..	380	14	130	4	40	4	6	3	2	1
40th Foot	14	..	308	3	315	4	173	5	77	1	26	2
43rd „	17	2	238	11	242	14	110	11	90	10	7	..
50th „	86	..	301	6	379	6	123	2	44	2	6	..
57th „	11	..	394	1	337	8	158	3	55	3	16	..
65th „	2	..	162	2	340	7	149	5	193	6	19	2
68th „	..	..	277	4	433	10	131	2	71	1	2	1
70th „	12	..	365	2	262	6	159	4	76	2	13	..
Total	578	4	3,143	54	3,242	73	1,710	45	828	30	154	7

APPENDIX No. XXVII.

ABSTRACT, showing the Ages of the Men serving in China and Japan, and the Deaths in each Quinquennial Period of Life, during the Year 1864.

	Under 20.		20–24.		25–29.		30–34.		35–39.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
EUROPEAN TROOPS:												
Royal Artillery ..	..	..	30	6	123	3	50	1	15	..	..	..
2nd Bat. 20th Foot	25	..	531	20	204	13	46	2	10	1	2	..
67th Foot	14	..	372	3	185	10	127	4	41	8	..	2
99th Foot	9	..	225	8	415	20	84	1	33	1	3	..
	48	..	1,158	37	927	46	307	8	99	10	5	2
ASIATIC TROOPS:												
Gun Lascars ..	4	..	32	2	31	..	6	..	6	..	1	..
22nd Bombay N.I.	16	..	26	2	247	8	241	..	130	3	105	4
H.M. 29th, or 2nd Belooch	201	..	200	4	235	4	70	9	52	2	31	2
	221	..	258	8	513	12	317	9	188	5	137	6

APPENDIX No. XXVIII.

ABSTRACT, showing the Admissions into Hospital and Deaths among Her Majesty's European Troops serving in Bengal, Madras, and Bombay, during the year 1864.

Stations	Bengal.		Madras.		Bombay.	
Average Strength	39,936		12,993		12,173	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*						
1. Miasmatic:						
Variola	88	13	8	2	32	4
Varioloides	3	..	..	..	10	..
Varicella	6	..	3	..	3	..
Morbilli	14	..	2	..	1	..
Tonsillitis	667	..	219	..	199	..
Influenza	140	..	75	..	50	..
Ophthalmia	1,576	..	661	..	478	..
Erysipelas	81	1	23	1	23	1
Furunculus	555	..	197	..	107	..
Anthrax	6	1	4	..	1	..
Dysenteria Acuta	1,263	63	759	18	386	12
„ Chronica	37	2	231	7		
Diarrhœa	3,665	36	1,361	12	899	11
Cholera Biliosa	13	..	3	..	2	1
„ Spasmodica	157	107	68	36	87	25
Febris Intermittens	16,566	36	1,992	4	4,385	5
„ Remittens	1,643	50	126	7	249	11
„ Recurrens	..	..	..	..	3	..
„ Typhoides	9	5	15	5	7	5
„ Typhus	2	..	1	1	..	..
„ Continua	2,662	26	757	20	534	6
Rheumatismus Acutus	2,533	3	369	..	826	..
„ Chronica	168	..	483	..		
Parotitis	32	..	15	..	5	..
Coryza	1	..	5	..	..	..
Diphtheria	2	..	..	..	..	..
Vaccinia	15	..	..	..	..	..
2. Enthetic:						
Syphilis Primaria	3,350	..	1,315	1	840	..
„ Secundaria	1,119	12	554	4	427	2
Cachexia Syphiloides	..	..	..	..	2	..
Iritis Syphilitica	44	..	23	..	13	..
Bubo	1,356	..	524	..	368	..
Gonorrhœa	3,310	..	957	..	1,051	..
Phymosis, &c.	50	..	18	..	14	..
Orchitis (Gonorrhœal)	246	..	70	..	75	..
Ophthalmia (Gonorrhœal)	1	..	..	..	..	..
Strictura Urethræ	122	1	46	1	51	..
Verrucæ	46	..	7	..	21	..
Ulcus Penis	2	..	18	..	104	..
Hæmorrhagia Urethræ	..	..	1	..	..	..
3. Dietic:						
Scorbutus	24	..	4	..	45	1
Purpura	7	1	2	..	2	..
Ebriositas	444	4	259	2	255	..

Appendix No. XXVIII.—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	39,936		12,993		12,173	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
4. Parasitic:						
Aphthæ	5	.	5	..	..	..
Porrigo	10	..	4	..	4	..
Scabies	67	..	80	..	20	..
Tænia Solium	226	..	37	..	83	..
„ Lata	..	..	..	..	4	..
Dracunculus	1	..	99	..	22	..
Vermes	33	..	13	..	8	..
Ascaris Lumbricoides	7	1	3	..	..	..
„ Vermicularis	..	..	1	..	..	..
Phthiriasis	1	..	..	..	..	..
II. *Constitutional Diseases.*						
1. Diathetic:						
Podagra	7	..	9	..	4	..
Lumbago	102	..	28	..	55	..
Anæmia	156	..	17	..	69	2
Anasarca	24	..	18	2	8	1
Tumores	18	..	16	..	9	..
Gangræna	..	..	..	..	1	1
Carcinoma	3	..	4	1	..	..
Scirrhoma	2	1	..	..	..	..
Lupus	5	..	1	..	..	..
2. Tubercular:						
Scrofula	69	1	68	1	31	..
Phthisis Pulmonalis	282	63	136	14	69	17
Hæmoptysis	78	4	9	..	11	..
Morbus Coxarius	1	..	2	..	1	..
Abscessus Psoanus	2	1	4	1	..	..
Tuberculosis	1	..	..	..	..	..
III. *Local Diseases.*						
1. Nervous System:						
Encephalitis	2	2	2	..	2	1
Meningitis	10	4	2	1	..	..
Apoplexia	31	35	6	6	2	2
Paralysis	69	12	34	..	27	3
Delirium Tremens	135	12	51	5	52	6
Mania	87	1	22	..	13	..
Amentia	69	..	33	1	10	1
Epilepsia	116	6	31	..	25	..
Convulsio	..	..	8	..	1	..
Hysteria	..	..	3	..	..	..
Chorea	4	..	..	..	..	..
Tetanus	1	1	..	..	..	..
Cephalæa et Vertigo	366	..	210	..	132	1
Neuralgia	181	..	41	..	36	..
Dysecoea	19	..	8	..	9	..
Otitis	329	..	96	..	89	..
Hordeolum	..	..	..	..	1	..
Glaucoma	3	..	..	..	1	..
Pterygium	..	..	..	..	2	..
Odontalgia	6	..	6	..	8	..
Fistula Lachrymalis	..	..	1	..	..	..
Amaurosis	3	..	5	..	17	..
Iritis	..	..	1	..	2	..

Appendix No. XXVIII.—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	39,936		12,993		12,173	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Nyctalopia	..	..	2	..	..	..
Cataractes	..	..	..	..	1	..
Hemeralopia	..	..	1	..	..	..
Myopia	..	..	..	..	3	..
Hypochondriasis	..	..	4	..	..	..
Cæcitas	21	..	1	..	1	..
Polypus Nasi	..	..	1	..	..	..
Rabies	3	3	1	1	1	1
Ozæna	..	..	4	..	1	..
Neuroma	1	..	..	..	..	..
2. Circulatory System:						
Carditis	16	1	32	2	58	4
Pericarditis	25	2	12	..	22	..
Hypertrophia Cordis	69	1	17	2	59	2
Atrophia „	..	..	5	1	..	..
Morbus Valv: „	135	15	78	6	17	7
Degeneratio „	1	2	..	..	..	..
Morbus „	..	1	..	..	..	..
Palpitatio	34	..	26	..	14	..
Angina Pectoris	30	..	9	..	4	..
Aneurisma Aortæ	2	4	1	1	11	5
Aneurisma	12	6	6	2	2	..
Varix	29	..	15	..	17	..
Phlebitis	1	..	2	..	1	..
Syncope	13	..	1	1	..	..
3. Respiratory System:						
Laryngitis	16	1	5	..	6	..
Bronchitis Acuta	1,783	24	498	..	552	2
„ Chronica	39	1	125	2		
Pleuritis	170	4	48	..	31	1
Hydrothorax	3	..	1	..	..	..
Pneumonia	100	22	41	1	29	1
Apoplexia Pulmonalis	..	..	1	1	..	..
Asthma	6	2	22	..	16	..
Emphysema	3	..	3	..	..	..
Epistaxis	14	..	11	..	2	..
Pleurodynia	15	..	5	..	2	..
Œdema Glottidis	2	..	..	..	..	..
4. Digestive System:						
Glossitis	1	..	3	..	..	..
Pharyngitis	3	..	3	..	3	..
Stomatitis	6	..	5	..	1	..
Gastritis	27	3	13	..	6	..
Enteritis	14	4	4	..	4	1
Peritonitis	25	8	6	1	5	2
Obstipatio	152	..	73	2	43	..
Dyspepsia	1,039	5	585	..	340	..
Colica	594	..	115	1	244	2
Intussusceptio	..	..	1	1	..	..
Hæmatemesis	11	1	..	..	..	..
Hernia	36	1	14	1	12	..
Hæmorrhois	378	..	150	..	148	..
Fistula in Ano	45	..	18	..	10	..
Strictura Recti	..	..	..	..	1	..
Prolapsus Ani	..	..	2	..	2	..

Appendix No. XXVIII.—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	39,936		12,993		12,173	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Splenitis	365	1	44	1	69	1
Hepatitis Acuta	1,942	87	507	23	507	29
„ Chronica	120	9	420	12		
Icterus	203	2	53	3	65	..
Cirrhosis	..	..	2	1	..	..
Ascites	5	1	2	1	2	1
Ileus	..	..	2	..	2	..
Melæna	1	..	1	1	2	..
5. Urinary System :						
Nephritis	43	1	13	3	10	..
Nephria	6	2	..	..	5	..
Ischuria	18	1	6	..	5	..
Hæmaturia	8	..	3	..	1	..
Lithiasis	1	..	6	..	2	..
Calculus Vesicæ	3	..	..	..	1	..
Cystitis	10	..	3	..	3	..
Fistula in Perineo	..	..	1	..	1	..
Enuresis	9	..	13	..	2	..
Diuresis	11	..	1	..	1	..
Diabetes	2	..	1	..	..	..
Morbus Prostaticus	3	..	1	..	..	..
6. Reproductive System :						
Varicocele	7	..	6	..	7	..
Hydrocele	25	..	19	..	7	..
Hæmatocele	..	..	..	..	1	..
Orchitis (not Gonorrhœal) ..	683	..	245	..	169	..
Spermatorrhœa	3	..	..	..	..	..
7. Locomotive System :						
Arthritis	32	..	14	..	5	..
Synovitis	90	..	23	..	17	..
Hydrarthrus	4	..	6	..	2	..
Contractura	6	..	5	..	2	..
Periostitis	94	..	22	..	40	..
Exostosis	3	..	1	..	1	..
Caries	7	..	8	..	3	..
Necrosis	11	..	6	..	2	..
Atrophia Musculorum	..	..	..	..	1	..
8. Integumentary System :						
Urticaria	27	..	13	..	12	..
Eczema	104	..	41	..	28	..
Herpes	109	..	44	..	20	..
Impetigo	15	..	7	..	5	..
Psoriasis	49	..	26	..	11	..
Lichen	20	..	19	..	1	..
Prurigo	5	..	1	..	2	..
Roseola	2	..	1	..	2	..
Ecthyma	7	..	7	..	1	..
Pityriasis	..	..	5	..	1	..
Lepra	9	..	6	..	2	..
Rupia	5	..	3	..	..	..
Pemphigus	1	..	9	..	..	..
Acne	7	..	3	..	..	..
Mentagra	1	..	4	..	..	..
Polypus	3	..	..	..	..	..
Alopecia	1	..	..	..	..	..

Appendix No. XXVIII.—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Average Strength	39,936		12,993		12,173	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Bullæ	1	..	..	..	..	..
Phlegmon	1,451	..	958	..	557	..
Abscessus	521	..	152	..	50	2
Paronychia	183	..	42	..	37	..
Ulcus	2,061	1	886	..	397	1
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	328	8	91	2	33	1
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	51	..	30	..	25	1
Explosio	15	1	6	5	1	..
Insolatio	68	29	43	9	13	5
Submersio	1	17	1	14	1	3
Fractura	162	7	77	2	51	2
Amputatio	12	..	..	..	3	..
Ictus Fulminis	2	..	..	1	..	..
Ruptura Hepatis	..	1	..	..	..	..
„ Splenis	..	1	..	..	..	..
Contusio	2,323	..	935	1	825	1
Commotio	9	3	2	..	..	..
Vulnus Sclopetarium	42	4	6	..	7	3
„ Incisum	364	..	193	1	130	..
Luxatura	54	..	16	..	11	..
Subluxatio	753	..	340	..	213	..
Vesiculæ Pedis	183	..	222	..	36	..
Venenatio	2	1	17	..	1	..
Morsus Canis	11	..	1	..	5	..
„ Hominis	..	..	..	..	1	..
„ Simiæ	..	..	1	..	..	..
„ Felis	2	..	..	..	..	..
„ Equi	3	..	..	..	..	..
„ Serpentis	1	..	..	..	..	..
„ Scorpionis	2	..	..	..	..	..
„ *Apis*	1	..	..	..	..	..
2. In Battle:						
Explosio	3	1	..	..	..	..
Vulnus Sclopetarium	2	2	..	..	..	..
Prœlio Occisi	..	6	..	..	..	..
3. Homicidal:						
Vulnus Incisum	1	1	..	..	2	1
Fractura	..	1	..	..	..	..
4. Suicidal:						
Vulnus Sclopetarium	..	5	1	3	1	3
„ Incisum	..	2	..	2	..	1
Submersio	..	..	..	..	..	1
Suspendum	..	..	..	2	..	1
Per Vias Ferreas	..	1	..	..	..	..
Suicidium	2	4	..	..	..	..
6. Punitus	46	..	61	..	16	..
Diseases not specified	54	2	..	..	..	..
No appreciable disease	..	..	23	..	..	..
Total	62,174	819	19,986	266	17	204

Appendix No. XXVIII.—*continued.*

CAUSES of the Deaths of the Invalids.

		Bengal.	Madras.	Bombay.
I.—1.	Erysipelas	..	1	..
	Dysenteria	14	8	3
	Diarrhœa	4	2	1
	Cholera	4	12	4
	Febris Intermittens ..	1	1	..
	„ Continua ..	1	..	1
	Rheumatismus	..	..	1
2.	Syphilis Secundaria ..	..	2	2
	Cachexia Syphiloidea ..	..	..	1
II.—1.	Anasarca	1	..	..
2.	Phthisis Pulmonalis ..	28	4	6
	Hæmoptysis	..	..	1
III.—1.	Amentia	1	..	..
	Paralysis	1	..	..
	Meningitis	..	1	..
2.	Morbus Valv: Cordis ..	3	1	..
	„ Cordis	3	..	..
	Aneurisma Aorta ..	1	..	..
3.	Laryngitis	1	..	..
	Bronchitis	1	..	..
	Pleuritis	1	..	..
	Pneumonia	1	1	1
4.	Intussusceptio	1	..	..
	Hernia	1	..	..
	Hepatitis	8	2	..
	Ascites	1	..	..
IV.—4.	Atrophia	4	..	..
V.—1.	Insolatio	..	1	..
	Submersio	1	..	..
	Total	82	36	21

APPENDIX No. XXIX.

ABSTRACT, showing the Number of Men sent Home as Invalids from Bengal, Madras, and Bombay, during the Year 1864. Also the Number finally Discharged the Service at the Invalid Depôt in England during the Year.

Stations..	Bengal.*		Madras.		Bombay.	
Strength	34,629	39,936	12,993		12,173	
	Discharged.		Discharged.		Discharged.	
Diseases.	In India.	At Netley.	In India.	At Netley.	In India.	At Netley.
I. *Zymotic Diseases.*						
1. Miasmatic Diseases:						
Ophthalmia	66	57	10	5	22	16
Erysipelas	..	1	2	..	..	..
Dysenteria Acuta ..	27	..	..	..	16	..
„ Chronica ..	25	17	61	4	..	7
Diarrhœa	..	5	16	1	6	1
Febris Intermittens ..	44	10	12	..	14	3
„ Remittens ..	15	1	1	..	1	..
„ Continua ..	7	..	4	..	..	..
Rheumatismus Acutus..	154	..	1	..	51	..
„ Chron:..	..	27	113	3	..	16
Parotitis	..	..	1	..	..	..
2. Enthetic Diseases:						
Syphilis Primaria ..	..	..	..	..	1	..
„ Secundaria ..	60	32	92	19	30	28
Cachexia Syphiloidea ..	4	..	..	..	..	..
Iritis Syphilitica ..	3	1	..	..	..	..
Bubo	..	1	2	..	2	1
Orchitis (Gonorrhœal) ..	3	..	..	..	..	..
Strictura Urethræ ..	7	1	1	..	3	..
Rheumatismus (Gon:)..	..	..	..	1	..	..
3. Dietic Diseases:						
Scorbutus	..	1	..	1	2	..
Ebriositas	..	..	2	..	..	..
4. Parasitic Diseases:						
Porrigo	..	..	..	..	1	..
Tænia Solium	1	..	1	..	..	..
II. *Constitutional Diseases.*						
1. Diathetic Diseases:						
Lumbago	..	1	..	..	2	..
Anæmia	32	18	5	2	7	11
Anasarca	..	..	..	..	1	..
Tumores	..	..	1	1	1	1
Lupus	1	1	1	..	..	..
Scirrhoma	1	..	..	..	..	..
2. Tubercular Diseases:						
Scrofula	12	6	18	3	6	4
Phthisis Pulmonalis ..	127	47	53	16	25	21
Hæmoptysis	..	..	3	..	..	1
Abscessus Psoanus ..	..	..	1	..	..	..
Morbus Coxarius ..	..	..	2	..	..	2
Tuberculosis	1	..	..	..	..	..

See explanation with regard to strength at page 145 of the Report.

Appendix No. XXIX.—*continued.*

Stations..	Bengal.		Madras.		Bombay.	
Strength	34,629	39,936	12,993		42,173	
	Discharged.		Discharged.		Discharged.	
Diseases.	In India.	At Netley	In India.	At Netley.	In India.	At Netley.
III. *Local Diseases.*						
1. Nervous System:						
Apoplexia	2	..	..	..	..	..
Paralysis	10	13	18	3	8	12
Mania	6	1	2	1	5	1
Amentia	14	..	11	..	7	..
Hypochondriasis ..	..	..	1	..	..	..
Epilepsia	23	18	15	4	3	7
Cephalæa	7	7	9	2	3	2
Neuralgia	2	..	3	1	1	..
Psellismus	1	..	..	..	..	..
Dysecœa	7	15	9	1	1	7
Otitis	1	..	2	..	3	..
Mydriasis	..	1	..	..	..	..
Amaurosis	..	4	4	1	5	1
Staphyloma	..	1	..	..	..	..
Cæcitas	10	6	5	1	..	2
Pterygium	..	..	..	..	1	..
Glaucoma	..	..	..	..	1	..
Hemeralopia	..	..	1	..	1	..
Ozæna	..	..	1	..	..	..
Myopia	..	1	1	..	2	..
Cataractes	..	..	..	..	1	1
2. Circulatory System:						
Carditis	1	3	7	..	11	2
Pericarditis	1	..	2	1	4	2
Hypertrophia Cordis ..	31	19	15	5	21	9
Degeneratio Cordis ..	1	..	..	..	..	..
Morbus Valv: Cordis ..	38	28	30	10	9	11
Aneurisma Aortæ ..	..	..	..	..	4	..
Aneurisma	2	1	5	..	..	1
Varix	9	6	5	1	4	1
Palpitatio	2	2	5	1	1	12
Angina Pectoris ..	1	2	..	..	1	..
3. Respiratory System:						
Laryngitis	..	1	2	..	..	1
Bronchitis Acuta ..	43	..	3	..	6	..
,, Chronica ..	..	9	27	4	..	10
Pleuritis	..	..	..	..	1	..
Hydrothorax	..	..	1	..	..	..
Pneumonia	..	..	2	1	..	..
Asthma	3	2	5	..	2	..
Emphysema	1	..	1	..	..	..
Epistaxis	..	..	1	..	..	..
4. Digestive System:						
Gastritis	..	1	1	..	1	..
Enteritis	..	..	1	..	..	..
Peritonitis	..	..	..	..	1	..
Dyspepsia	8	2	15	2	7	3
Hernia	12	12	10	2	4	5

Appendix No. XXIX.—*continued.*

Stations..	Bengal.		Madras.		Bombay.	
Strength	34,629	39,936	12,993		12,173	
Diseases.	Discharged.		Discharged.		Discharged.	
	In India.	At Netley.	In India.	At Netley.	In India.	At Netley.
Hæmorrhois	1	..	2	..	3	..
Fistula in Ano	1	..	3	..	1	1
Prolapsus Ani	..	..	2	..	..	..
Splenitis	12	2	1	..	2	2
Hepatitis	169	73	91	11	51	31
Cirrhosis	..	..	1	..	..	..
Ascites	1	..	..	..	..	1
5. Urinary System:						
Nephritis	1	..	1	..	..	1
Nephria..	..	..	..	..	3	..
Cystitis	..	..	1	..	..	..
Calculus Vesicæ ..	..	..	..	..	1	..
Diabetes	2	1	2	1	..	1
6. Reproductive System:						
Varicocele	..	..	5	..	..	..
Hydrocele	..	..	2	2	..	..
Orchitis(not Gonorrhœal)	6	4	12	..	4	2
7. Locomotive System:						
Arthritis	1	2	1	..	..	2
Synovitis	2	1	..	..	..	..
Hydrarthrus	..	..	1	..	..	..
Contractura	3	3	..	2	1	2
Periostitis	3	5	2	..	4	2
Exostosis	1	..	..	..	..	..
Caries	3	2	2	1	..	..
Necrosis	4	2	3	..	..	2
Atrophia Musculorum ..	..	1	..	..	1	1
8. Integumentary System:						
Pityriasis	..	..	1	..	..	..
Phlegmon	..	..	..	..	1	..
Abscessus	..	1	..	..	1	..
Ulcus	13	11	18	2	3	1
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	109	157	51	25	4	32
Senectus	8	..	..	..	..	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Explosio	2	2	..	..	1	1
Insolatio	1	..	..	..	..	..
Fractura	7	7	9	3	8	3
Amputatio	2	1	4	..	1	2
Contusio	3	..	1	..	..	4

Appendix No. XXIX.—*continued.*

Stations	Bengal.		Madras.		Bombay.	
Strength	34,629	39,936	12,993		12,173	
Diseases.	Discharged.		Discharged.		Discharged.	
	In India.	At Netley.	In India.	At Netley.	In India.	At Netley.
Commotio	1	..	..	..	..	..
Vulnus Sclopetarium	6	2	2	..	..	1
„ Incisum	3	..	..	..	..	..
Luxatura	..	3	..	..	2	4
Subluxatio	2	1	1	..	..	..
Vesiculæ Pedis	1	..	1	..	..	..
Diseases not specified	1	..	2	..	..	..
Total	1,195	663	845	144	402	298

APPENDIX No. XXX.

ABSTRACT, showing the Ages of the Troops serving in the Bengal Presidency, and the Deaths at each Age, during the Year 1864.

	Under 20.		20–24.		25–29.		30–34.		35–39.		40 and Upwards.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
C Brigade, Royal Horse Artillery..	22	..	345	3	309	11	103	2	57	..	16	..	852	16
2nd Dragoon Guards	7	..	99	2	275	4	58	5	14	2	6	..	459	13
7th „ „	6	..	136	1	314	3	77	1	20	..	4	..	557	5
5th Lancers	10	..	338	6	134	10	9	3	17	2	4	..	512	21
7th Hussars	2	..	21	..	244	11	286	5	56	..	49	1	658	17
19th „	..	..	126	2	281	5	58	..	28	..	14	1	507	8
20th „	..	..	126	1	293	3	78	..	28	..	20	..	545	4
21st „	..	..	325	1	156	4	39	1	11	..	1	..	532	6
1st Battalion, 7th Foot	7	..	254	5	539	7	138	4	44	2	7	..	989	18
1st „ 19th „	26	1	314	6	355	6	130	3	63	3	2	1	890	20
1st „ 20th „	45	..	531	4	242	7	79	4	16	2	3	1	916	18
1st „ 23rd „	2	..	278	3	493	11	117	3	32	1	1	..	923	18
27th Foot	3	1	155	3	487	10	91	8	94	4	24	..	854	26
34th „	1	..	509	4	254	10	75	1	6	..	..	1	845	16
35th „	60	..	289	2	394	7	109	3	84	1	6	1	942	14
36th „	125	4	367	32	227	19	105	7	38	4	2	..	864	66
38th „	33	..	436	1	296	12	99	8	15	1	..	..	879	22
42nd „	4	..	406	9	312	5	100	5	36	1	7	..	865	20
46th „	25	..	522	2	251	9	98	1	34	..	2	..	932	12
48th „	24	..	449	1	107	12	61	6	30	3	2	1	673	23
51st „	4	..	601	..	199	7	73	4	45	2	2	1	924	14
54th „	29	..	334	2	346	11	158	5	48	1	6	1	921	20
71st „	13	..	320	2	313	2	153	..	44	3	..	1	843	8
77th „	6	..	413	14	304	15	78	3	24	4	5	..	830	36
79th „	20	..	403	5	384	8	145	1	11	2	..	..	963	16

Appendix No. XXX.—*continued.*

ABSTRACT, showing the Ages of the Troops serving in the Bengal Presidency, &c.—*continued.*

	Under 20.		20–24.		25–29.		30–44.		35–39.		40 and Upwards.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
80th Foot	8	..	356	3	382	9	149	3	48	2	7	1	950	18
81st „	19	..	201	..	365	5	222	2	91	2	12	2	910	11
82nd „	47	..	579	3	194	7	75	3	25	2	7	1	927	16
88th „	7	..	225	6	540	12	114	7	50	2	3	..	939	27
89th „	4	..	409	1	254	7	169	2	68	2	12	..	916	12
91st „	17	..	299	2	367	9	148	4	55	2	7	..	893	17
93rd „	29	..	336	3	365	3	117	4	24	2	..	..	871	12
94th „	9	2	166	3	357	4	111	2	63	4	5	..	711	15
97th „	24	..	214	3	329	14	213	..	169	..	4	..	953	17
98th „	10	..	295	3	366	4	255	4	72	3	14	1	1,012	15
101st „	1	..	392	1	426	5	74	2	51	1	5	..	949	9
104th „	..	4	444	4	248	4	26	1	75	4	30	1	823	18
2nd Battalion, Rifle Brigade ..	10	..	321	2	457	5	113	4	32	2	5	..	938	13
3rd „ „ „ ..	14	..	483	2	403	8	91	..	7	..	1	..	999	10
Total	673	12	12,817	147	12,562	305	4,394	121	1,725	66	295	16	32,466	667

Appendix No. XXX.—*continued.*

ABSTRACT, showing the Ages of the Troops serving in the Madras Command, and the Deaths at each Age, during the Year 1864.

	Under 20 Years.		20–24.		25–29.		30–34.		35–39.		40 and upwards.		Total.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
D Brigade, Royal Horse Artillery.	11	..	253	4	187	7	112	4	81	1	14	3	658	19
14th „ Royal Artillery ..	3	..	93	2	257	7	106	9	11	..	1	..	471	18
17th „ „ ..	5	..	195	2	166	1	100	3	22	1	23	1	511	8
23rd „ „ ..	23	1	357	3	325	11	146	4	111	4	12	..	974	23
1st Dragoon Guards	5	..	61	..	267	2	155	2	32	..	28	3	548	7
17th Lancers	8	..	123	3	291	5	76	1	8	1	12	..	518	10
1st Battalion, 1st Foot	15	..	243	4	413	14	169	4	57	8	8	2	905	32
1st „ 18th „	18	..	231	1	453	13	147	1	69	2	6	..	924	17
2nd „ 19th „	31	..	468	9	267	15	49	2	15	1	..	..	830	27
2nd „ 21st „	120	..	605	8	160	4	76	4	17	1	..	..	978	17
3rd „ 60th „	8	1	164	1	609	12	118	5	18	2	6	1	923	22
66th Foot	6	..	186	3	433	7	213	5	86	4	5	1	929	20
102nd „	36	..	376	5	217	6	117	2	68	2	9	..	823	15
105th „	10	..	456	5	189	1	67	1	23	6	10	1	755	14
108th „	36	..	127	4	115	1	78	..	8	..	1	..	365	5
Total ..	335	2	3,938	54	4,349	106	1,729	47	626	33	135	12	11,112	254

Appendix No. XXX.—*continued.*

ABSTRACT, showing the Ages of the Troops serving in the Bombay Command, and the Deaths at each Age, during the Year 1864.

	Under 20 Years.		20–24.		25–29.		30–34.		35–39.		40 and upwards.		Total.	
	trength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
E Brigade, Royal Horse Artillery	41	..	165	3	112	8	187	5	84	2	15	..	604	18
14th „ Royal Artillery ..	2	1	73	2	288	5	115	2	22	..	5	..	505	10
18th „ „	6	..	231	2	433	6	208	7	149	3	47	2	1,074	20
21st „ „	5	..	286	3	200	8	86	6	51	1	7	..	635	18
Sappers	..	..	18	..	19	2	4	..	2	..	1	..	44	2
3rd Dragoon Guards	25	..	206	1	173	3	29	1	23	..	10	..	466	5
6th Dragoons	..	..	269	1	221	11	35	3	11	1	9	..	545	16
1st Battalion, 4th Foot	52	..	262	1	380	6	194	1	48	2	17	..	953	10
33rd Foot	8	..	199	2	449	2	156	6	83	4	10	..	905	14
44th „	13	..	242	1	381	5	186	3	110	7	23	2	955	18
56th „	30	..	310	6	338	4	95	..	65	2	10	..	848	12
72nd „	35	..	232	4	402	7	114	3	72	..	8	..	863	14
95th „	28	..	358	3	407	3	152	1	41	..	2	..	988	7
103rd „	123	1	289	6	278	5	187	3	59	8	7	..	943	23
106th „	1	..	105	1	80	3	80	1	91	8	8	3	365	16
109th „	156	..	300	1	225	3	98	2	28	2	5	2	812	10
Total	525	2	3,545	37	4,386	81	1,926	44	939	40	184	9	11,505	213

APPENDIX No. XXXI.

ABSTRACT, showing the Cases of Sickness and Deaths among Troops on board Ship, proceeding on Foreign Service.

Stations	India, China, Ceylon, Mauritius, and Cape.		Mediterranean, British America, and West Indies.		Australasia.	
Number of Men Embarked	9,008		1,099		829	
Average Annual Strength	2,506		116		169	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. *Zymotic Diseases.*						
1. Miasmatic:						
Varicella	1	..	..	..	..	..
Scarlatina	1	..	..	..	..	..
Tonsillitis	93	..	4	..	6	..
Influenza	4	..	..	..	..	..
Ophthalmia	52	..	..	..	2	..
Erysipelas	8	..	..	..	1	..
Furunculus	42	..	..	..	2	..
Anthrax	2	..	..	..	..	..
Dysenteria Acuta	4	..	..	..	..	..
Diarrhœa	45	..	1	..	3	..
Febris Intermittens	16	..	..	..	..	..
„ Remittens	1	..	..	..	..	..
„ Typhoides	2	..	..	..	1	1
„ Typhus	1	1	..	..	1	..
„ Continua	75	3	1	..	1	..
Rheumatismus Acutus	36	..	..	..	2	..
„ Chronicus	29	..	..	..	3	..
Diphtheria	1	1	..	..	..	..
2. Enthetic:						
Syphilis Primaria	147	..	9	..	16	..
„ Secundaria	77	..	2	..	1	..
Iritis Syphilitica	1	..	..	..	..	..
Bubo	65	..	..	..	9	..
Gonorrhœa	127	..	5	..	16	..
Phymosis, &c.	9	..	..	..	4	..
Orchitis (Gonorrhœal)	20	..	1	..	1	..
Strictura Urethræ	4	..	..	..	..	..
Ulcus Penis	7	..	..	..	..	..
3. Dietic:						
Scorbutus	12	..	1	..	1	..
4. Parasitic:						
Scabies	11	..	..	..	3	..
Tænia Solium	3	..	..	..	..	..
Phthiriasis	1	..	..	..	..	..
II. *Constitutional Diseases.*						
1. Diathetic:						
Lumbago	1	..	..	..	..	..
Anæmia	4	..	..	..	..	..

Appendix No. XXXI.—*continued.*

Stations	India, China, Ceylon, Mauritius, and Cape.		Mediterranean, British America, and West Indies		Australasia.	
Number of Men Embarked	9,008		1,099		829	
Average Annual Strength	2,506		116		169	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Anasarca	10	..	..	..	..	..
Podagra	3	..	..	..	..	..
2. Tubercular:						
Scrofula	1	..	..	..	1	..
Phthisis Pulmonalis	9	2	..	..	2	..
Hæmoptysis	1	..	..	..	..	..
III. *Local Diseases.*						
1. Nervous System:						
Delirium Tremens	1	1	..	..	..	..
Amentia	2	..	..	..	..	..
Epilepsia	9	..	2	..	..	..
Cephalæa	9	..	..	..	2	..
Neuralgia	13	..	..	..	1	..
Otitis	31	..	..	..	..	..
Hemeralopia	1	..	..	..	..	..
Iritis	..	..	..	..	1	..
2. Circulatory System:						
Pericarditis	1	..	..	..	..	..
Hypertrophia cordis	1	..	..	..	..	..
Morbus Valv: Cordis	3	1	..	..	..	..
Palpitatio	..	..	..	..	2	..
Aneurisma Aortæ	1	1	..	..	..	..
"	1	1	..	..	..	..
Varix	2	..	..	..	..	..
Phlebitis	..	..	..	..	1	..
3. Respiratory System:						
Bronchitis Acuta	91	..	1	..	12	..
" Chronica	25	..	2	..	3	..
Pleuritis	11	..	..	..	1	..
Pneumonia	5	..	..	..	1	..
Asthma	..	..	..	..	1	..
4. Digestive System:						
Stomatitis	...	..	..	..	1	..
Enteritis	1	..	..	..	..	..
Peritonitis	1	..	..	..	..	..
Obstipatio	5	..	..	..	..	..
Dyspepsia	51	..	..	..	27	..
Colica	7	..	..	..	..	..
Hernia	1	..	..	..	..	..
Hæmorrhois	9	..	..	..	2	..
Fistula in ano	1	..	..	..	..	..
Hepatitis Acuta	..	..	..	..	1	..
Icterus	13	..	..	..	3	..
Ascites	..	..	1	..	..	..

Appendix No. XXXI.—*continued.*

Stations	India, China, Ceylon, Mauritius, and Cape.		Mediterranean, British America, and West Indies.		Australasia.	
Number of Men Embarked	9,008		1,099		829	
Average Annual Strength	2,506		116		169	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
6. Reproductive System:						
Hydrocele	3	..	..	..	1	..
Orchitis (not Gonorrhœal)	14	..	..	..	1	..
7. Locomotive System:						
Arthritis	4	..	..	..	..	..
Synovitis	2	..	..	..	..	..
8. Integumentary System:						
Eczema	10	..	..	..	1	..
Herpes	3	..	..	..	..	..
Impetigo	2	..	..	..	..	..
Psoriasis	5	..	..	..	..	..
Acne	4	..	..	..	..	..
Phlegmon	87	..	4	..	1	..
Abscessus	56	..	1	..	4	..
Paronychia	14	..	..	..	..	..
Ulcus	95	..	1	..	2	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	9	..	..	..	1	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	25	..		..	..	..
Explosio	1	..		..	..	..
Insolatio	4	1		..	..	..
Submersio	..	2		..	..	1
Fractura	10	..	1	..	..	..
Contusio	83	..	1	..	5	..
Commotio	..	..	2	..	..	..
Vulnus Incisum	41	..	1	..	1	..
Luxatura	3	..	..	..	..	..
Subluxatio	24	..	..	..	3	..
6. Punitus	5	..	..	..	..	..
No appreciable disease	5	..	..	..	..	..
Total	1,731	14	41	..	155	2

APPENDIX No. XXXII.

ABSTRACT, showing the Cases of Sickness and Deaths among Troops on board Ship returning from Foreign Service.

Stations	From India and Ceylon.		From West Indies and Mediterranean		From British America.	
Number of Men Embarked	4,064		1,607		2,645	
Average Annual Strength	1,123		124		122	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I. Zymotic Diseases.						
1. Miasmatic:						
Variola	1	..	..	..	..	..
Morbilli	..	..	1	..	..	..
Tonsillitis	9	..	..	..	2	..
Ophthalmia	34	..	3	..	..	..
Furunculus	10	..	..	..	..	..
Dysenteria Acuta	23	6	..	..	..	..
„ Chronica	13	1	..	..	..	..
Diarrhœa	52	3	..	..	1	..
Cholera	10	..	..	..	..	..
Febris Intermittens	39	1	5	..	1	..
„ Remittens	6	1	..	..	..	..
„ Continua	18	..	..	..	1	..
Rheumatismus Acutus	24	..	..	..	..	..
„ Chronicus	29	..	1	..	1	..
2. Enthetic:						
Syphilis Primaria	29	..	6	..	10	..
„ Secundaria	30	1	1	..	2	..
Iritis Syphilitica	1	..	..	..	..	..
Bubo	14	..	1	..	9	..
Gonorrhœa	40	..	5	..	2	..
Orchitis (Gonorrhœal)	4	..	..	..	2	..
Verrucæ	1	..	..	..	..	..
Ulcus Penis	4	..	..	..	..	..
3. Dietic:						
Scorbutus	3	..	..	..	..	..
Ebriositas	3	..	..	..	..	..
II. Constitutional Diseases.						
1. Diathetic:						
Anæmia	1	..	..	..	..	..
Anasarca	1	..	..	..	..	..
Tumores	1	..	..	..	..	..

Appendix No. XXXII.—*continued.*

Stations	From India and Ceylon.		From West Indies and Mediterranean		From British America.	
Number of Men Embarked	4,064		1,607		2,645	
Average Annual Strength	1,123		124		122	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
2. Tubercular:						
Scrofula	5	..	..	..	..	..
Phthisis Pulmonalis	10	4	..	..	3	1
Hæmoptysis	3	1	..	..	..	..
III. *Local Diseases.*						
1. Nervous System:						
Apoplexia	..	..	..	..	..	1
Paralysis	..	..	1	..	..	..
Mania	..	..	1	..	..	..
Epilepsia	3	..	..	..	2	..
Cephalæa	2	..	..	..	1	..
Neuralgia	2	..	..	..	..	..
Otitis	3	..	..	..	..	..
2. Circulatory System:						
Pericarditis	1	..	..	..	..	..
Morbus Valv.: Cordis	3	..	..	..	..	..
Aneurisma	1	1	..	..	..	..
3. Respiratory System:						
Bronchitis Acuta	53	..	2	1	..	..
„ Chronica	6	..	1	..	..	..
Pneumonia	2	1	1	..	..	..
Apoplexia Pulmonalis	1	..	..	..	..	..
4. Digestive System:						
Gastritis	1	..	..	..	..	..
Enteritis	..	1	..	..	..	..
Obstipatio	1	..	..	..	..	..
Dyspepsia	13	..	..	..	2	..
Colica	3	..	..	..	..	..
Hernia	2	..	..	..	..	..
Hæmorrhois	2	..	..	..	..	..
Splenitis	2	..	..	..	..	..
Hepatitis Acuta	8	..	..	..	..	..
„ Chronica	12	3	..	..	..	..
Icterus	4	..	..	..	2	..
Ascites	1	..	..	..	..	..
5. Urinary System:						
Dysuria	1	..	..	..	..	..
6. Reproductive System:						
Hydrocele	..	..	..	..	1	..
Orchitis (not Gonorrhœal)	7	..	..	..	..	..

Appendix No. XXXII.—*continued.*

Stations	From India and Ceylon.		From West Indies and Mediterranean		From British America.	
Number of Men Embarked ..	4,064		1,607		2,645	
Average Annual Strength ..	1,123		124		122	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
8. Integumentary System:						
Eczema	3	..	1	..	..	..
Herpes	5	..	1	..	..	..
Psoriasis	1	..	..	..	..	..
Phlegmon	31	..	1	..	1	..
Abscessus	11	..	..	..	1	..
Paronychia	10	..	1	..	..	..
Ulcus	40	..	2	..	6	..
IV. *Developmental Diseases.*						
4. Diseases of Nutrition:						
Atrophia	6	..	..	..	1	..
V. *Violent Deaths or Diseases.*						
1. Accidental:						
Ambustio	7	..	..	..	..	..
Insolatio	..	..	..	..	1	1
Fractura	6	..	2	..	..	..
Contusio	28	..	..	..	1	..
Vulnus Incisum	7	..	..	..	1	..
Subluxatio	7	..	..	..	1	..
6. Punitus	1	..	..	..	..	..
No appreciable disease ..	2	..	1	..	..	..
Total	717	24	38	1	55	3

APPENDIX XXXIII.

ABSTRACT, showing the Cases of Sickness and Deaths among Troops on Board Ship proceeding from one Colony or Station to another.

Stations	White Troops.		Black Troops. Between West Indies and Africa.	
Number of Men Embarked	7,137		1,058	
Average Annual Strength	602		122	
Diseases.	Admitted.	Died.	Admitted.	Died.
I. Zymotic Diseases.				
1. Miasmatic:				
Morbilli	..	..	2	..
Tonsillitis	3	..	1	..
Ophthalmia	52	..	..	..
Furunculus	9	..	..	..
Dysenteria Acuta	5	..	1	..
„ Chronica	2	..	..	..
Diarrhœa	43	..	..	..
Cholera	3	3	..	..
Febris Intermittens	3	..	7	..
„ Remittens	45	..	10	..
„ Continua	50	1	..	..
Rheumatismus Acutus	10	..	1	..
„ Chronicus	4	..	..	..
2. Enthetic:				
Syphilis Primaria	19	..	10	..
„ Secundaria	9	..	..	..
Bubo	9	..	4	..
Gonorrhœa	12	..	3	..
Phymosis	1	..	..	..
Orchitis (Gonorrhœal)	2	..	..	..
3. Dietic:				
Purpura	1	..	..	..
4. Parasitic:				
Dracunculus	..	..	2	..
II. Constitutional Diseases.				..
1. Diathetic:				
Anasarca	..	..	1	..
2. Tubercular.				
Phthisis Pulmonalis	11	..	..	..
Hæmoptysis	1	..	..	..
III. Local Diseases.				
1. Nervous System:				
Paralysis	1	..	..	..
Epilepsia	1	..	..	..
Otitis	1	..	..	..

Appendix No. XXXIII.—*continued.*

Stations	White Troops.		Black Troops. Between West Indies and Africa.	
Number of Men Embarked	7,137		1,058	
Average Annual Strength	602		122	
Diseases.	Admitted.	Died.	Admitted.	Died.
2. Circulatory System:				
Pericarditis	..	..	1	..
3. Respiratory System:				
Bronchitis Acuta	10	1	43	3
„ Chronica	2	..	..	..
Pneumonia	3	..	8	3
4. Digestive System:				
Obstipatio	4	..	..	..
Dyspepsia	4	..	1	..
Hernia	1	..	..	..
Hæmorrhois	1	..	1	..
Hepatitis Chronica	1	..	..	..
8. Integumentary System:				
Eczema	1	..	..	..
Phlegmon	32	..	2	..
Abscessus	8	..	3	..
Paronychia	1	..	..	..
Ulcus	16	..	5	..
IV. *Developmental Diseases.* Diseases of Nutrition:				
ophia	2	..	..	..
V. *Violent Deaths or Diseases.* 1. Accidental:				
Ambustio	3	..	1	..
Contusio	14	..	3	..
Commotio	2	..	..	..
Vulnus Incisum	13	..	..	..
Luxatura	1	..	..	..
Subluxatio	6	..	..	..
6. Punitus	2	..	..	..
No appreciable disease	1	..	..	..
Total	425	5	110	7

APPENDIX

ABSTRACT of Results of Meteorological

AUCKLAND, NEW ZEALAND. Lat. 36° 50′ 05″ S.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Mean of all the highest.	Mean of all the lowest.	Mean Daily Range.	Mean Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Hygrometer. Dry Bulb.	Hygrometer. Wet Bulb.
January	29·750	29·978	29·382	87·5	43·0	44·5	76·6	49·4	27·2	63·0	86·3	48·4	71·2	63·5
February	29·830	30·113	29·443	91·0	42·0	49·0	78·9	50·1	28·8	64·5	88·1	47·8	73·0	64·8
March	29·934	30·267	29·509	84·0	41·5	42·5	73·9	51·7	22·2	62·8	...	49·6	67·3	60·7
April	30·076	30·324	29·728	78·0	46·6	31·4	73·2	54·8	18·4	64·0	83·7	51·5	66·7	60·0
May	29·845	30·248	29·211	69·5	38·8	30·7	63·0	48·5	14·5	55·7	73·3	46·4	63·5	52·9
June	29·802	30·365	29·364	66·2	38·5	27·7	58·7	46·1	12·6	52·4	67·2	43·2	54·4	50·1
July	29·823	30·403	29·215	64·5	41·5	23·0	60·5	49·5	11·0	55·0	72·1	44·0	55·3	51·0
August	29·662	30·218	29·059	66·8	35·8	31·0	60·1	47·1	13·0	53·6	71·6	41·6	54·8	49·7
September ...	29·749	30·178	29·430	69·2	47·0	22·2	63·9	51·7	12·2	57·8	76·7	45·9	58·8	53·3
October... ...	29·809	30·136	29·241	74·8	46·9	27·9	67·3	55·0	12·3	61·2	76·8	49·8	62·0	56·6
November ...	29·766	30·028	29·383	80·0	43·5	36·5	71·3	54·8	16·5	63·1	80·5	49·9	65·6	58·7
December ...	29·791	30·011	29·279	87·5	38·8	33·7	79·3	61·2	18·1	70·2	90·6	57·6	72·3	65·3
Yearly Sums, Means, and Totals ...	29·820	30·189	29·354	76·6	43·2	33·4	68·9	51·7	17·2	60·3	78·8	48·0	63·7	57·2

GIBRALTAR. Lat. 36° 6′ 20″ N.

January	30·159	30·413	29·715	63·0	43·0	[illegible]	58·7	50·5	8·2	54·6	73·1	46·8	52·2	51·9
February	29·978	30·350	29·481	67·5	38·0	[illegible]	59·7	48·8	10·9	54·2	...	44·0	55·7	51·4
March	29·864	30·197	29·368	68·0	44·0	[illegible]	62·5	50·5	12·0	56·5	...	46·3	56·5	54·6
April	29·946	30·193	29·729	74·0	48·0	[illegible]	67·7	54·0	13·7	60·8	119·1	50·7	63·0	58·8
May	29·945	30·156	29·699	85·0	53·0	[illegible]	75·1	59·8	15·3	67·4	134·7	56·8	69·8	64·9
June	30·036	30·205	29·730	87·5	59·0	[illegible]	82·1	64·0	18·1	73·0	142·4	60·0	74·8	71·2
July	29·934	30·151	29·877	92·0	62·0	[illegible]	86·1	60·4	19·7	76·2	141·7	62·0	78·4	74·1
August	29·994	30·136	29·820	94·0	65·0	29·0	84·0	70·1	13·9	77·0	134·1	67·5	78·6	74·3
September ...	30·042	30·196	29·871	87·0	56·0	31·0	78·2	66·3	11·9	72·2	123·1	62·9	77·5	69·3
October... ...	29·801	29·979	29·334	79·0	53·0	26·0	71·1	59·6	11·5	65·3	107·2	56·5	66·7	52·0
November ...	30·002	30·406	29·823	71·0	46·0	25·0	64·7	53·8	10·9	59·2	94·9	47·7	60·6	56·1
December ...	29·995	30·279	29·293	64·5	41·0	23·5	58·9	48·1	10·8	53·5	76·0	41·2	54·6	50·9
Yearly Sums, Means, and Totals ...	29·979	30·222	29·628	77·7	50·7	27·0	73·2	57·2	13·0	64·2	114·6	53·5	65·7	60·9

UP PARK CAMP, JAMAICA. Lat. 17° 59′ 50″ N.

January	29·649	29·725	29·571	98·0	72·5	25·5	91·3	76·0	15·3	83·6	113·7	64·6	80·3	71·8
February	29·686	29·752	29·602	96·3	71·2	25·1	90·6	75·5	15·1	83·0	112·5	69·8	80·9	72·3
March	29·566	29·854	29·454	88·0	60·2	27·8	81·9	67·4	14·5	74·6	...	...	79·0	71·0
April	29·701	29·774	29·620	89·4	65·8	23·6	85·4	69·9	15·5	77·5	...	62·2	80·4	73·6
May	29·725	29·746	29·620	89·5	61·0	28·5	85·3	70·8	14·5	78·1	110·3	65·0	79·7	73·4
June	29·689	29·767	29·592	90·0	69·5	20·5	86·9	71·7	15·2	79·3	111·0	63·2	81·4	74·0
July	29·662	29·747	29·608	92·5	70·0	22·5	88·7	74·2	14·5	81·5	116·4	61·1	82·7	74·9
August	29·716	29·723	29·712	95·0	70·0	25·0	92·6	72·8	19·8	82·7	116·6	52·5	83·6	74·0
September ...	29·746	29·768	29·691	97·0	72·0	25·0	91·4	75·5	15·9	83·2	129·6	64·0	86·4	79·8
October... ...	29·717	29·740	29·687	94·0	70·0	24·0	91·3	71·0	20·3	81·1	136·2	57·1	83·0	79·2
November ...	29·719	29·751	29·692	92·0	70·0	22·0	90·7	71·8	18·9	81·2	136·5	58·0	84·3	79·2
December ...	29·718	29·749	29·689	95·0	70·0	25·0	91·6	71·0	20·6	81·3	137·3	56·5	84·0	79·3
Yearly Sums, Means, and Totals ...	29·691	29·758	29·628	93·0	68·5	24·5	89·0	72·3	16·7	80·6	122·0	61·3	82·2	75·2

No. XXXIV.

Observations taken in the Year 1864.

Long. 174° 50′ 40″ E. Height above Sea 140 feet.

Hygrometrical Results, from Glaisher's Tables (3rd Edition).						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	22 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
57·7	·477	5·2	3·1	62·4	517·6	6·75	6·50	8·25	9·50	0	...	...	5·6	...	8	3·16	3·14
58·7	·496	5·3	3·5	61·2	517·0	6·00	6·00	8·75	8·25	0	...	...	6·3	...	4	0·47	0·31
55·4	·451	4·8	2·5	65·6	524·8	3·75	3·50	13·00	10·75	0	...	...	5·0	...	5	...	1·50
54·6	·427	4·7	2·4	65·2	527·8	9·75	9·75	4·75	5·75	0	...	...	5·2	...	6	...	0·48
44·0	·287	3·2	3·3	49·1	528·0	2·50	2·00	12·25	14·25	0	...	...	5·5	...	20	...	5·16
46·0	·309	3·5	1·3	72·6	536·4	4·00	4·75	13·75	7·50	0	...	...	5·2	...	18	...	4·56
47·0	·323	3·7	1·2	73·5	535·8	4·00	6·00	11·50	9·50	0	...	...	5·7	...	18	4·69	4·52
44·8	·297	3·4	1·5	68·5	533·6	4·25	5·25	12·50	9·00	0	...	...	5·7	...	19	5·47	5·39
48·4	·340	3·8	1·8	68·5	530·7	7·50	6·00	6·25	10·25	0	...	...	6·7	...	19	3·46	2·68
51·9	·388	4·3	1·9	70·0	528·3	10·75	7·25	5·00	8·00	0	...	...	6·7	...	18	3·84	3·46
53·1	·404	4·4	2·5	64·2	523·8	5·25	2·50	10·00	12·25	0	...	...	6·7	...	12	...	3·18
60·0	·520	5·6	3·0	65·0	517·0	11·50	8·25	4·00	7·25	0	...	...	6·3	...	12	...	5·89
51·8	·393	4·3	2·3	65·5	526·6	76·00	67·75	100·00	112·25	...	...	...	5·9	...	159	...	40·26

Long. 5° 20′ 53″ W. Height above Sea 50 feet.

51·6	·384	4·3	·1	98·7	544·8	4·75	17·75	2·00	6·50	0	...	382·6	6·8	1·7	11	2·575	2·495
47·3	·329	3·7	1·3	73·9	538·1	4·25	8·75	4·50	11·50	0	...	377·6	6·1	2·2	14	2·780	2·650
52·8	·399	4·4	·7	87·0	534·7	·75	8·50	8·50	13·25	0	...	393·5	6·5	2·8	17	8·535	8·425
54·2	·406	4·5	2·0	68·8	528·9	1·50	13·00	7·50	8·00	0	...	284·0	4·7	2·8	13	...	4·436
61·2	·538	5·9	1·9	74·3	521·9	2·00	12·75	8·25	8·00	0	...	323·4	3·7	2·3	4	1·000	·980
68·6	·700	7·5	1·8	81·0	517·5	3·75	5·75	11·50	9·00	0	...	314·8	2·5	2·2	3	...	·220
71·1	·763	8·2	2·3	77·9	512·8	4·25	9·00	5·25	12·50	0	...	301·0	1·4	2·1	0	...	...
71·3	·769	8·2	2·3	78·1	512·7	3·25	10·00	3·75	5·00	0	...	368·4	3·6	2·7	0	...	...
63·6	·588	6·4	3·8	62·7	515·6	5·50	15·25	5·00	4·25	0	...	365·8	4·7	2·1	2	...	·160
41·9	·264	2·9	4·3	40·4	524·3	4·00	7·00	7·75	12·25	0	...	...	7·6	2·4	19	...	11·682
52·2	·390	4·4	1·5	73·6	533·1	10·50	5·75	·75	13·00	0	...	...	5·8	1·7	8	2·707	2·535
47·4	·327	3·7	1·1	76·4	539·6	9·50	8·00	2·75	10·75	0	...	317·0	6·2	1·7	12	...	6·885
56·8	·488	5·3	2·3	74·4	527·0	54·00	130·50	67·50	114·00	...	...	...	5·0	2·2	103	...	40·468

Long. 74° 56′ 30″ W. Height above Sea 225 feet.

66·2	·639	6·9	4·2	61·5	506·1	·00	14·25	16·50	·25	0	...	...	1·2	1·1	6	4·14	...
66·5	·650	7·0	4·3	61·5	506·0	·00	14·25	14·75	·0	0	...	...	1·3	1·2	4	9·72	...
65·3	·628	6·8	3·8	63·0	505·9	2·75	14·25	14·00	0	0	...	...	...	2·9	2	7·00	...
69·0	·709	7·6	3·6	67·8	506·5	11·25	10·25	8·50	0	0	...	...	...	3·0	7	3·00	...
69·2	·712	7·6	3·3	69·8	507·4	·00	15·00	16·00	0	0	...	...	...	1·8	10	35·51	...
69·1	·709	7·6	3·9	66·4	505·3	3·50	14·25	12·25	0	0	...	...	2·1	1·4	4	6·10	...
69·7	·726	7·7	4·2	65·5	503·1	·25	15·50	15·25	0	0	...	...	1·9	1·7	5	5·75	...
67·7	·674	7·2	5·0	58·2	503·9	9·75	14·00	7·25	0	0	...	...	1·8	1·8	11	17·35	...
75·5	·887	9·3	4·0	70·4	500·7	8·75	15·50	5·75	0	0	...	...	2·2	1·8	17	17·50	...
76·1	·899	9·6	2·7	77·4	502·2	4·00	12·75	14·25	6	0	...	...	1·6	1·6	7	7·70	...
75·9	·894	9·4	3·0	75·6	502·2	1·50	14·50	14·00	0	0	...	...	1·6	1·6	7	6·00	...
76·2	·903	9·6	2·8	74·8	502·1	·00	16·75	14·25	0	0	...	...	1·5	1·8	7	7·30	...
70·5	·752	8·0	3·7	67·7	504·2	41·75	171·25	152·75	·25	...	...	...	2·2	1·8	87	97·07	...

* 25 feet above the ground.

HALIFAX, NOVA SCOTIA. Lat. 44° 39′ 20″ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
							Mean						Hygrometer.	
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Dry Bulb.	Wet Bulb.
January	29·810	30·412	29·136	50·0	3·4	53·4	32·0	16·8	15·2	24·4	55·5	17·4	24·5	23·6
February	29·645	30·478	28·730	49·6	3·1	52·7	33·3	18·3	15·0	25·8	69·5	19·6	26·1	25·0
March	29·634	30·066	28·821	52·7	13·2	39·5	38·1	23·9	14·2	31·0	80·5	23·1	32·3	30·2
April	29·794	30·198	29·205	61·0	18·2	42·8	46·1	29·5	16·6	37·8	87·5	27·4	39·6	36·4
May	29·756	30·229	29·384	70·3	30·2	40·1	58·9	39·1	19·8	49·0	96·4	39·3	50·6	47·2
June	29·726	30·201	29·102	92·5	37·1	55·4	68·3	46·3	22·0	57·3	110·1	44·1	59·9	54·5
July	29·793	30·194	29·541	88·0	45·2	37·8	75·2	51·9	23·3	63·5	116·5	50·0	66·7	60·7
August	29·780	30·126	29·314	83·0	46·1	36·9	72·4	55·8	16·6	64·1	111·7	54·0	65·8	61·7
September ...	29·802	30·252	29·110	73·0	37·2	35·8	66·7	47·8	18·9	57·2	110·2	48·1	59·6	55·7
October... ...	29·640	30·397	29·160	67·8	28·6	39·2	54·8	39·3	15·5	47·1	92·7	38·2	48·8	46·0
November ...	29·842	30·454	29·239	59·2	19·0	40·2	44·7	32·3	12·4	38·5	72·6	29·9	49·0	38·2
December ...	29·666	30·476	28·571	53·0	6·5	59·5	40·3	18·5	21·8	29·4	64·0	18·5	28·1	26·9
Yearly Sums, Means, and Totals ...	29·741	30·290	29·109	66·2	21·8	44·4	52·6	35·0	17·6	43·8	97·3	34·1	45·9	42·2

NASSAU, BAHAMAS. Lat. 25° 4′ 0″ N.

January	30·106	30·292	29·956	79·5	62·0	17·5	75·5	67·4	8·1	71·4	94·1	66·1	71·8	66·6
February	30·054	30·203	29·866	79·0	60·0	19·0	73·7	65·0	8·7	69·3	92·3	63·6	69·7	64·2
March	29·934	30·142	29·745	84·0	59·5	24·5	76·6	66·2	10·4	71·4	92·9	64·1	72·3	66·9
April	29·985	30·181	29·836	84·0	59·0	25·0	77·6	66·8	10·8	72·2	92·3	70·3	73·6	68·2
May	29·864	30·064	29·761	84·0	64·5	19·5	80·2	69·4	10·8	74·8	92·6	70·3	76·0	69·4
June	30·010	30·151	29·910	88·0	68·0	20·0	84·8	74·3	10·5	79·5	96·6	72·1	80·8	70·0
July	30·034	30·145	29·934	89·5	70·0	19·5	85·2	75·5	9·7	80·3	100·9	74·4	81·8	75·8
August	30·020	30·142	29·928	88·0	71·5	16·5	83·9	76·4	7·5	80·1	101·0	74·6	81·2	76·5
September ...	29·983	30·107	29·918	86·0	73·0	13·0	84·5	76·0	8·5	80·2	146·8	74·5	81·0	76·7
October... ...	29·945	30·063	29·818	87·5	66·0	21·5	82·3	72·9	9·4	77·6	141·3	71·6	77·7	73·0
November ...	30·036	30·286	29·858	84·0	60·0	24·0	80·2	70·8	9·4	75·5	127·0	69·7	74·6	70·7
December ...	30·048	30·201	29·921	81·0	60·5	20·5	78·2	68·9	9·3	73·5	114·4	67·7	74·2	69·4
Yearly Sums, Means, and Totals ...	30·002	30·165	29·871	84·5	64·5	20·0	80·2	70·8	9·4	75·6	108·5	69·9	76·2	70·6

ALDERSHOT CAMP. Lat. 51° 15′ 25″ N.

January	29·804	30·168	29·468	52·5	13·0	39·5	41·2	31·9	9·3	36·5	45·7	28·5	36·7	35·8
February	29·541	29·869	29·001	56·0	22·5	33·5	41·2	30·7	10·5	37·0	49·3	28·6	36·8	36·0
March	29·339	29·896	28·616	62·0	25·8	36·2	50·1	34·6	15·5	42·8	60·6	30·6	44·3	40·9
April	29·699	29·978	29·356	72·0	32·5	39·5	59·7	39·6	20·1	49·6	74·2	35·3	52·8	47·4
May	29·625	29·853	29·254	83·5	35·6	47·9	66·4	45·8	20·6	56·1	87·5	42·1	59·3	53·7
June	29·603	29·895	29·223	76·4	40·0	36·4	69·5	48·1	21·4	58·8	96·2	42·6	61·9	56·0
July	29·650	29·839	29·360	86·2	44·0	42·2	74·9	50·9	24·0	62·9	101·6	45·2	67·0	59·2
August	29·711	30·068	29·336	87·0	38·0	49·0	72·3	48·8	23·5	60·5	95·3	41·6	65·1	59·3
September ...	29·571	29·982	28·999	74·5	43·0	31·5	66·9	49·6	17·3	58·3	85·8	45·2	60·7	47·3
October... ...	29·468	29·955	28·836	65·8	37·5	28·3	57·2	44·3	12·9	50·7	65·4	37·9	51·8	49·0
November ...	29·396	30·168	28·469	54·0	24·5	29·5	48·7	35·9	12·8	42·3	54·4	30·1	42·9	31·5
December ...	29·583	30·092	29·097	54·0	18·2	35·8	42·5	34·5	8·0	38·5	47·5	30·4	38·7	38·0
Yearly Sums, Means, and Totals ...	29·582	29·980	29·067	68·6	31·2	37·4	57·5	41·2	16·3	49·4	72·0	36·5	51·5	46·2

No. XXXIV—*continued.*

Long. 63° 36′ 40″ W. Height above Sea 137 feet.

Hygrometrical Results, from Glaisher's Tables (3rd Edition).						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	40 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
18·5	·102	1·2	·3	76·5	571·2	9·50	2·75	4·50	14·25	0	...	258·1	6·7	1·4	10	7·53	...
19·5	·106	1·3	·4	74·5	566·2	7·25	3·25	6·50	11·50	0·5	...	242·9	7·2	1·6	15	6·06	...
25·6	·139	1·7	·4	74·9	558·6	11·00	6·75	5·50	7·75	0	...	341·3	6·3	0·9	11	3·54	...
32·2	·183	2·1	·7	75·6	553·0	9·25	9·25	6·75	4·75	0	...	316·4	6·8	0·8	10	2·28	...
43·6	·284	3·3	·9	77·6	539·7	6·25	9·75	10·50	4·50	0	...	194·3	7·4	1·3	15	4·13	2·67
49·7	·358	4·0	1·8	69·0	530·9	6·25	4·00	7·50	12·25	0	...	224·7	4·6	1·2	10	1·79	1·18
56·0	·448	4·9	2·2	67·3	522·9	6·50	4·25	8·75	11·50	0	...	202·4	5·1	2·4	8	1·93	1·56
58·3	·483	5·4	1·6	77·5	523·3	4·25	5·50	11·50	9·75	0	...	173·4	6·3	2·0	13	4·44	3·87
52·3	·392	4·4	1·3	75·8	530·5	6·50	5·50	8·00	10·00	0	...	200·6	6·2	1·6	6	5·07	3·69
43·0	·278	3·2	·7	80·4	539·6	10·25	5·50	4·75	10·50	0	...	275·3	7·3	1·4	13	5·84	4·05
26·5	·144	1·6	2·4	41·8	544·0	7·00	3·25	7·00	12·75	0	...	229·1	7·8	1·3	13	5·93	3·65
22·1	·118	1·4	0·4	75·2	564·2	9·25	4·00	5·75	12·00	0	...	...	7·8	1·5	11	2·95	1·30
37·3	·253	2·9	1·1	72·2	545·3	93·25	63·75	87·00	121·50	0·5	...	241·7	6·6	1·5	135	51·49	...

Long. 77° 20′ 0″ W. Height above Sea 78 feet.

																	*
62·7	·571	6·2	2·3	72·8	532·1	10·60	15·25	4·50	1·25	0	...	...	4·6	...	7	...	3·03
60·0	·515	5·6	2·3	71·2	524·0	13·25	11·25	2·00	2·50	0	...	...	3·4	...	7	...	3·44
62·9	·574	6·2	2·4	73·1	519·1	8·00	9·00	8·25	5·75	0	...	...	4·2	...	9	3·36	2·00
64·2	·602	6·6	2·4	72·6	518·4	9·75	10·50	4·25	5·50	0	...	...	3·9	...	4	...	4·06
64·7	·611	6·6	3·1	68·5	514·2	8·00	15·25	5·75	2·00	0	...	...	4·7	...	10	...	14·23
62·8	·570	6·1	5·2	53·6	518·8	3·50	18·50	8·00	...	0	...	...	5·6	...	13	...	10·79
72·6	·781	8·4	3·3	72·0	511·1	1·50	21·50	8·00	...	0	...	...	5·5	...	13	...	14·60
73·3	·816	8·8	2·6	77·2	510·4	4·75	19·25	6·25	·75	0	...	...	5·7	...	17	...	16·27
73·7	·831	8·9	2·4	78·8	509·9	5·00	19·00	4·50	1·50	0	...	...	4·4	...	10	...	5·37
69·7	·727	7·9	2·3	76·2	513·0	14·50	13·00	4·75	1·75	0	...	...	5·0	...	10	...	7·90
67·9	·683	7·3	1·9	79·5	517·7	13·00	12·50	3·25	1·25	0	...	...	4·7	...	7	...	5·49
65·9	·629	6·9	2·3	75·2	518·6	8·50	14·25	6·50	1·75	0	...	...	5·2	...	1	...	0·50
66·7	·659	7·1	2·7	72·6	516·0	96·75	179·25	66·00	24·00	...	...	...	4·7	...	108	...	89·48

Long. 0° 45′ 36″ W. Height above Sea 325 feet.

																	†
33·8	·201	2·4	·4	92·6	556·3	4·00	10·50	8·50	8·00	0	...	270·0	7·3	1·3	9	·920	0·670
34·9	·203	2·4	·2	92·8	551·3	9·50	6·50	5·00	8·00	0	...	328·0	8·2	1·6	10	1·230	0·885
36·9	·220	2·5	·8	74·9	539·2	6·50	2·50	5·00	10·00	0	...	348·0	7·3	1·5	14	2·940	2·170
42·0	·267	3·0	1·4	67·0	536·6	7·00	11·00	4·50	7·50	0	...	297·0	6·2	1·0	9	1·645	1·240
48·7	·344	3·9	1·8	63·7	528·1	10·00	11·00	4·00	6·00	0	...	253·0	6·5	1·4	8	1·620	1·370
51·0	·373	4·1	2·0	67·5	524·7	4·50	2·00	6·50	17·00	0	...	331·0	7·0	1·3	13	·920	·760
52·9	·400	4·4	2·9	60·3	520·5	7·50	6·50	5·50	11·50	0	...	310·0	6·2	1·0	6	·340	·270
54·6	·425	4·7	2·1	69·1	523·2	8·50	6·00	5·50	11·00	0	...	269·0	6·2	1·3	5	·810	·760
35·6	·209	2·3	3·6	38·8	526·3	3·00	2·50	8·50	16·00	0	...	280·2	6·8	1·7	11	3·250	2·860
46·2	·314	3·5	·8	81·2	533·0	6·00	14·00	5·00	6·00	0	...	298·0	6·8	·9	9	1·580	1·350
47·8	·098	1·1	2·0	35·8	536·9	5·50	6·00	9·00	9·50	0	...	308·0	7·0	1·6	12	2·520	2·000
37·1	·221	2·6	·4	84·4	555·4	4·00	9·50	11·50	6·00	0	...	244·0	8·4	·7	7	·840	·690
41·0	·273	3·1	1·5	69·9	537·6	76·00	95·00	78·50	106·50	...	...	294·7	7·0	1·3	113	18·615	14·965

* 22 feet above the ground. † 25 feet above the ground.

NETLEY.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
							Mean						Hygrometer.	
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Dry Bulb.	Wet Bulb.
January	30·159	30·572	29·892	55·0	16·0	39·0	44·3	33·1	11·2	38·7	64·1	31·6	38·8	37·8
February ...	29·881	30·343	29·363	56·0	20·5	35·5	43·6	31·1	12·5	37·3	77·2	28·4	39·1	37·8
March	29·621	30·266	28·943	61·0	26·0	35·0	51·2	35·9	15·2	43·5	87·4	34·5	45·8	42·8
April	30·034	30·340	29·667	68·8	34·0	34·8	58·9	39·8	19·1	49·3	97·6	34·6	52·5	48·6
May	29·957	30·292	29·530	83·5	34·0	49·5	66·5	44·7	21·8	55·6	110·2	...	59·4	55·6
June	29·921	30·290	29·477	73·5	39·0	34·5	67·9	48·7	19·2	58·3	111·3	43·3	61·2	57·1
July	29·996	30·188	29·628	84·5	42·0	42·5	74·5	50·0	24·5	62·2	125·0	44·5	66·4	60·7
August	30·041	30·406	29·487	81·5	37·0	44·5	71·3	47·8	23·5	59·5	...	44·8	64·3	58·5
September ...	29·911	30·374	29·304	77·0	40·6	37·0	66·9	49·3	17·6	58·1	...	45·4	61·5	57·8
October... ...	29·771	30·295	28·928	71·5	34·5	37·0	59·7	42·6	17·1	51·1	90·0	38·3	54·5	50·7
November ...	29·999	30·475	29·461	59·5	24·0	35·5	43·5	33·7	9·8	38·6	59·4	29·4	39·7	38·7
December ...	29·769	30·805	28·700	55·0	25·0	30·0	50·8	35·1	15·7	42·8	67·0	28·3	45·1	43·5
Yearly Sums, Means, and Totals ...	29·922	30·387	29·365	68·9	31·0	37·9	58·3	41·0	17·3	49·6	88·7	36·6	52·4	49·1

FORT GEORGE, GUERNSEY. Lat. 49° 33′ N.

January	29·913	30·261	29·494	52·0	26·0	26·0	44·9	39·4	5·5	42·1	61·6	36·2	42·0	40·5
February ...	29·665	30·145	29·019	52·5	26·5	26·0	42·9	36·7	6·2	39·8	64·7	33·3	40·6	38·4
March	29·420	30·104	28·823	56·5	33·5	23·0	49·4	42·2	7·2	45·8	85·3	38·5	46·1	43·8
April	29·802	30·057	29·470	64·5	40·5	24·0	54·5	45·5	9·0	50·0	96·5	40·4	50·7	48·2
May	29·752	29·961	29·282	75·0	46·0	29·0	59·8	49·8	10·0	54·8	105·3	45·5	56·0	52·5
June	29·772	31·100	29·228	63·0	49·5	13·5	59·9	52·2	7·7	56·0	102·2	48·8	56·8	53·9
July	29·800	30·028	29·508	72·5	52·0	20·5	65·2	55·8	9·4	60·5	108·8	51·0	61·2	58·0
August	29·856	30·150	29·360	68·5	50·0	18·5	64·6	55·8	8·8	60·2	106·3	49·9	60·9	57·0
September ...	29·743	30·124	29·222	70·5	50·5	20·0	63·3	54·6	8·7	58·9	100·8	50·3	59·8	57·1
October... ...	29·538	30·121	28·741	64·0	44·5	19·5	58·5	49·8	8·7	54·1	86·3	45·8	54·6	51·4
November ...	29·547	30·302	28·501	56·5	36·0	20·5	51·9	43·3	8·6	47·6	66·8	39·8	48·3	46·0
December ...	29·742	30·104	29·149	54·0	32·5	21·5	46·6	39·7	6·9	43·1	57·7	35·7	43·3	41·6
Yearly Sums, Means, and Totals ...	29·713	30·205	29·150	62·5	40·6	21·9	55·1	47·1	8·0	51·1	86·8	42·9	51·7	49·0

BOMBAY. Lat. 18° 57′ N.

January	29·958	30·085	29·786	85·0	60·2	24·8	80·3	64·2	16·1	72·2	109·5	109·5	75·3	64·2
February ...	29·979	30·142	29·748	89·3	64·2	25·1	83·5	68·5	15·0	76·0	114·7	111·7	78·7	67·8
March	29·894	30·008	29·801	90·4	66·5	23·9	86·5	71·5	14·0	78·5	114·7	68·8	81·9	71·1
April	29·825	29·980	29·665	92·0	72·7	19·3	87·5	75·6	11·9	81·5	117·9	73·4	85·1	75·5
May	29·819	29·950	29·695	94·0	76·0	18·0	90·3	79·0	11·3	84·6	120·4	76·7	87·5	77·7
June	29·676	29·816	29·505	94·5	75·0	19·5	89·7	79·9	9·8	84·8	108·5	77·9	86·9	79·7
July	29·664	29·804	29·537	91·0	76·5	14·5	86·3	79·0	7·3	82·6	101·1	77·6	83·7	78·7
August	29·749	29·850	29·645	88·2	74·5	13·7	84·9	77·1	7·8	81·0	98·8	76·0	82·0	77·6
September ...	29·798	29·933	29·664	94·4	75·2	19·2	87·1	76·9	10·2	82·0	110·4	75·5	84·0	76·7
October... ...	29·865	30·030	29·712	93·5	72·5	21·0	89·3	76·1	13·2	82·7	123·2	73·9	80·5	76·8
November ...	29·929	30·063	29·754	92·5	71·5	21·0	88·7	75·2	13·5	81·9	134·0	71·8	84·3	73·5
December ...	29·938	30·068	29·822	91·0	69·3	21·7	87·8	72·2	15·6	80·0	141·3	79·0	82·4	70·8
Yearly Sums, Means, and Totals ...	29·841	29·977	29·694	91·3	71·2	20·1	86·7	74·6	12·1	80·6	116·2	81·2	82·7	74·2

No. XXXIV—*continued.*

NETLEY.

Hygrometrical Results, from Glaisher's Tables (3rd Edition).						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation.	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days.	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	23 Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
36·5	·217	2·6	·2	92·6	560·4	5·75	11·00	8·00	6·25	0	...	218·3	6·7	1·2	14	2·130	1·650
36·3	·213	2·4	·4	89·6	550·1	8·50	8·25	4·25	7·50	0·5	...	251·2	6·6	2·0	9	1·270	1·020
39·4	·243	2·8	·3	78·8	542·8	7·50	7·50	8·25	7·75	0	...	277·2	6·2	2·8	17	2·980	2·515
44·7	·295	3·4	1·1	73·9	542·8	5·00	9·25	8·75	7·00	0	...	176·1	5·5	2·5	10	2·215	1·905
52·2	·392	4·4	1·3	77·6	533·4	8·50	7·00	8·00	7·50	0	...	184·1	5·7	2·7	8	1·090	·945
53·5	·410	4·6	1·4	76·5	530·9	3·25	1·50	8·75	16·50	0	...	265·9	6·0	3·3	12	·835	·700
56·2	·445	5·0	2·2	69·9	526·7	2·25	3·25	10·75	14·75	0	...	229·8	5·0	2·5	4	·163	·115
53·7	·414	4·6	2·1	68·3	529·9	5·50	4·75	8·50	12·25	0	...	194·8	5·9	2·0	8	·850	·763
54·6	·427	4·7	1·4	78·5	530·2	2·50	1·75	10·00	14·75	1	...	252·8	6·2	2·3	18	2·920	1·866
47·1	·322	3·7	1·1	76·2	535·8	8·25	12·50	5·00	4·75	0·5	...	252·9	5·6	1·9	9	·770	·625
39·4	·225	2·6	·4	92·0	555·2	7·25	7·75	8·75	6·25	0	...	202·9	7·3	2·3	9	1·290	1·160
41·6	·263	3·0	·4	87·9	546·0	10·50	8·00	5·50	5·00	0	...	242·2	7·3	3·3	14	2·945	2·460
46·3	·322	3·6	1·1	80·2	540·3	74·75	82·50	94·50	110·25	2	...	229·0	6·2	2·4	132	19·458	15·664

Long. 2° 40′ W. Height above Sea 248 feet.

38·6	·235	2·7	·4	88·5	552·3	2·25	6·50	15·25	7·00	0	...	332·5	8·2	1·6	12	1·590	1·200
35·6	·208	2·4	·5	83·0	549·3	6·25	9·00	8·50	5·25	0	...	462·4	8·0	1·8	14	1·670	1·230
41·0	·259	3·0	·6	74·0	538·7	6·50	8·00	8·75	7·75	0	...	445·4	6·8	3·5	19	3·740	3·325
45·6	·307	3·5	·7	83·2	540·4	9·00	10·75	4·00	6·25	0	...	318·4	5·7	2·2	10	·840	·680
49·2	·352	3·9	1·1	78·0	533·6	7·50	13·00	2·25	8·25	0	...	316·5	5·2	3·7	8	·770	·530
51·2	·377	4·2	1·0	81·6	533·0	5·25	2·50	3·50	18·75	0	...	380·6	7·3	7·5	17	2·045	1·580
55·3	·437	4·8	1·2	81·0	528·6	6·50	8·25	4·00	12·25	0	...	311·4	6·8	7·2	10	1·210	1·020
53·7	·412	4·6	1·3	77·5	529·9	9·50	8·50	4·50	8·50	0	...	320·6	5·7	5·0	9	1·390	·840
54·8	·429	4·8	1·0	83·8	529·8	3·50	4·00	7·75	14·75	0	...	376·6	6·8	6·0	25	3·440	2·995
48·3	·338	3·9	·9	78·8	531·1	4·50	15·75	5·75	5·00	0	...	504·8	6·4	2·7	11	1·175	1·085
43·5	·283	3·3	·6	83·9	538·6	6·75	7·00	7·75	8·50	0	...	516·8	8·2	...	21	5·510	5·095
39·5	·243	2·8	·4	86·7	547·6	6·00	9·50	12·25	2·25	1	...	417·2	7·6	...	16	2·190	1·995
46·4	·323	3·7	·8	81·7	537·7	73·50	102·75	84·25	104·50	...	...	391·9	6·9	4·1	172	25·570	20·575

Long. 72° 52′ E. BOMBAY.

56·3	·453	4·9	4·5	51·7	517·3	...	...	...	...	...	...	...	...	...	...	...	...
60·3	·524	5·7	4·8	52·7	513·8	...	...	...	...	...	...	...	...	...	...	...	...
63·8	·593	6·4	5·3	53·7	522·8	...	...	...	...	...	...	...	...	...	...	...	...
69·2	·717	7·6	5·3	59·2	504·1	...	...	...	...	...	...	...	...	...	...	...	...
71·4	·772	8·1	5·7	58·6	501·5	...	...	...	...	...	...	...	...	...	...	...	...
75·2	·873	9·2	4·4	68·1	499·1	...	...	...	...	...	...	...	...	...	...	...	...
75·4	·879	9·5	2·9	76·0	501·6	...	...	...	...	...	...	...	...	...	...	...	...
74·6	·858	9·2	2·5	78·4	504·7	...	...	...	...	...	...	...	...	...	...	...	...
71·3	·781	8·3	4·1	66·8	504·2	...	...	...	...	...	...	...	...	...	...	...	...
74·3	·848	9·1	2·1	82·4	508·2	...	...	...	...	...	...	...	...	...	...	...	...
66·4	·649	6·9	5·7	54·6	503·9	...	...	...	...	...	...	...	...	...	...	...	...
63·0	·577	6·1	5·7	51·9	509·4	16·5	3·00	·25	6·25	0	·2	...	3·1	...	...	...	...
68·4	·710	7·6	4·4	62·8	500·3	...	...	...	...	...	...	...	...	...	...	...	...

* 29 feet above the ground.

Appendix

Camp Poona. Lat. 18° 31′ N.

Month.	Readings of the Barometer.			Temperature of the Air.							Mean Daily Readings of			
							Mean						Hygrometer.	
	Mean reduced and corrected to 32°.	Highest reduced and corrected to 32°.	Lowest reduced and corrected to 32°.	Highest during Month.	Lowest during Month.	Range during Month.	Of all the highest.	Of all the lowest.	Daily Range.	Approximate Temperature.	Maximum in Sun's rays.	Minimum on Grass.	Dry Bulb.	Wet Bulb.
January	27·978	28·153	27·838	83·6	59·1	24·5	78·6	57·1	21·5	67·8	97·8	50·2	69·9	56·4
February	27·945	28·229	27·753	87·4	56·0	31·4	83·1	62·8	20·3	72·9	101·2	54·3	74·8	60·9
March	27·920	28·082	27·776	94·2	56·9	37·3	89·9	69·3	20·6	79·6	109·3	57·6	82·2	64·3
April	27·855	28·024	27·721	99·4	69·8	29·6	94·2	73·8	20·4	84·0	113·9	63·1	86·6	68·6
May	27·845	27·974	27·690	96·3	71·6	24·7	92·7	75·2	17·5	83·9	113·3	66·4	85·6	70·1
June	27·728	27·883	27·543	92·8	71·7	21·1	86·0	74·5	11·5	80·2	103·7	69·3	81·0	73·1
July	27·721	27·868	27·569	85·2	70·2	15·0	79·3	72·3	7·0	75·8	94·7	68·8	76·3	70·8
August	27·797	27·947	27·678	82·4	69·0	13·4	78·2	71·1	7·1	74·6	94·8	67·7	75·2	70·1
September ...	27·860	28·038	27·721	91·6	68·6	23·0	82·3	72·0	10·3	77·1	100·6	67·7	78·2	70·5
October... ...	27·932	28·079	27·749	92·3	66·4	25·9	87·3	71·1	16·2	79·2	107·2	64·3	81·3	67·4
November ...	27·997	28·145	27·851	87·9	61·7	26·2	82·8	67·9	14·9	75·3	101·2	62·3	77·0	66·5
December ...	28·005	28·162	27·857	86·4	59·2	27·2	82·6	63·9	18·7	73·2	101·2	56·7	76·0	63·5
Yearly Sums, Means, and Totals ...	27·867	28·049	27·729	90·0	65·0	25·0	84·7	69·2	15·5	76·9	103·2	63·2	78·7	66·8

Belgaum. Lat. 15° 50′ N.

January	27·405	27·511	27·307	87·6	52·1	35·5	83·5	54·7	28·8	69·1	109·4	47·4	78·2	58·7
February	27·397	27·602	27·217	90·3	52·1	38·2	86·5	56·4	30·1	71·4	115·9	50·7	77·3	60·8
March	27·381	27·500	27·290	98·9	56·9	42·0	95·2	62·9	32·3	79·0	136·0	57·2	84·1	64·0
April	27·316	27·466	27·199	101·6	61·3	40·3	96·8	66·6	30·2	81·7	137·7	64·1	86·6	68·6
May	27·319	27·418	27·211	99·1	59·0	40·1	93·4	65·4	28·0	79·4	133·0	63·3	83·0	69·8
June	27·224	27·368	27·059	90·5	64·8	25·7	81·6	67·2	14·4	74·4	91·4	66·2	75·7	71·6
July	27·245	27·369	27·149	80·2	65·0	15·2	75·9	66·2	9·7	71·0	77·7	64·6	72·5	69·6
August	27·289	27·389	27·200	83·6	62·5	21·1	77·6	65·2	12·4	71·4	82·5	63·3	72·5	69·4
September ...	27·328	27·439	27·215	88·8	61·6	27·2	80·9	64·1	16·8	72·5	100·6	61·8	74·3	69·4
October... ...	27·379	27·480	87·242	90·4	58·2	32·2	87·7	62·2	25·5	74·9	130·2	58·2	79·8	67·0
November ...	27·427	27·533	27·253	88·2	57·1	31·1	84·1	62·3	21·8	73·2	117·4	59·1	77·4	65·4
December ...	27·437	27·567	27·337	87·3	54·8	32·5	83·8	59·9	23·9	71·8	101·1	58·8	76·0	62·3
Yearly Sums, Means, and Totals ...	27·345	27·470	27·223	90·5	58·8	31·7	85·6	62·8	22·8	74·2	111·1	67·9	77·7	66·4

Kurrachee. Lat. 24° 51′ N.

January	30·092	30·241	29·970	81·0	45·0	36·0	74·3	53·3	21·0	63·8	94·3	50·9	69·9	60·1
February	30·058	30·348	29·791	83·3	43·0	40·3	77·5	54·3	23·2	65·9	97·2	50·6	72·2	59·4
March	30·004	30·171	29·851	86·4	45·5	40·9	81·5	59·7	21·8	70·6	97·1	57·0	76·6	65·8
April	29·914	30·116	29·760	95·0	64·0	31·0	86·8	69·4	17·4	78·1	104·1	67·1	82·6	72·8
May	29·827	30·006	29·620	94·6	68·0	26·6	88·7	75·0	13·7	81·8	102·4	73·2	85·4	76·8
June	29·634	29·752	29·515	105·6	76·0	29·6	92·5	72·5	20·0	82·5	...	78·8	89·0	79·3
July	29·550	29·676	29·403	91·0	73·5	17·5	88·5	78·5	10·0	83·5	103·4	77·8	85·8	79·3
August	29·672	29·876	29·503	89·4	74·0	15·4	87·3	77·4	9·9	82·3	102·0	72·3	84·0	77·0
September ...	29·826	30·078	29·666	89·0	70·4	18·6	87·1	75·3	11·8	81·2	103·2	70·9	83·9	76·3
October... ...	29·993	30·149	29·871	92·0	64·0	28·0	86·8	69·2	17·6	78·0	103·8	67·2	82·7	73·9
November ...	30·094	30·235	29·948	97·5	50·6	46·9	88·6	60·8	27·8	74·7	111·2	58·9	82·7	63·2
December ...	30·131	30·335	29·967	84·0	44·0	40·0	77·2	52·5	24·7	64·8	101·2	50·8	71·7	58·1
Yearly Sums, Means, and Totals ...	29·900	30·081	29·739	90·7	59·8	30·9	84·7	66·5	18·2	75·6	101·8	64·6	80·5	70·2

No. XXXIV—*continued.*

Long. 73° 53′ E. Height above Sea 1,750 feet.

Hygrometrical Results, from Glaisher's Tables (3rd Edition).						Atmospherical Conditions.											
		In a Cubic Foot of Air.				Number of Days for mean Direction of Wind.					Calculated from Robinson's Anemometer.					Amount of Rain fall.	
Mean Temperature of Dew Point.	Mean elastic Force of Vapour.	Mean Weight of Vapour.	Mean additional Weight required for Saturation	Mean Degree of Humidity.	Mean Weight of Cubic Foot of Air.	North.	East.	South.	West.	Number of calm, or nearly calm, Days	Mean daily pressure of Wind.	Mean daily Horizontal Movement of the Air.	Amount of Cloud 0—10.	Ozone Scale 0—10.	Number of Days on which Rain fell.	On the Ground.	Feet above the Ground.
											lbs. per sq. foot	Miles				Inches	Inches
46·0	·311	3·4	4·6	42·5	489·0	...	...	...	...	...	...	...	...	...	...	...	...
50·8	·373	4·0	5·3	43·2	483·7	...	...	...	...	...	...	...	...	...	...	...	...
52·1	·392	4·1	7·6	35·1	476·7	...	...	...	...	...	...	...	...	...	...	...	...
57·0	·464	4·9	8·5	36·0	471·0	...	...	...	...	...	...	...	...	...	...	...	...
60·0	·519	5·5	7·5	42·1	471·7	...	...	...	...	...	...	...	...	...	...	...	...
67·7	·679	7·2	4·1	64·4	472·4	...	...	...	...	...	...	...	...	...	...	...	...
66·9	·660	7·1	2·7	71·2	476·5	...	...	...	...	...	...	...	...	...	...	...	...
66·4	·650	7·0	2·4	73·7	478·9	...	...	...	...	...	...	...	...	...	...	...	...
65·1	·619	6·7	3·7	64·4	477·6	...	...	...	...	...	...	...	...	...	...	...	...
58·0	·483	5·2	6·2	44·6	477·0	...	...	...	...	...	...	...	...	...	...	...	...
59·1	·503	5·4	4·6	54·5	481·7	...	...	...	...	...	...	...	...	...	...	...	...
54·6	·428	4·6	5·1	47·5	483·1	...	...	...	...	...	...	...	...	...	...	...	...
58·6	·507	5·4	5·2	51·6	478·3	...	...	...	...	...	...	...	...	...	...	...	...

Long. 74° 36′ E. Height above Sea 2,500 feet.

47·9	·335	3·6	5·2	41·0	475·9	...	...	...	...	...	...	...	...	...	...	...	...
49·3	·351	3·8	6·3	37·0	472·2	...	...	...	...	...	...	...	...	...	...	...	...
50·8	·371	4·0	8·4	31·8	465·8	...	...	...	...	...	...	...	...	...	...	...	...
56·9	·464	4·9	8·5	36·0	462·2	...	...	...	...	...	...	...	...	...	...	...	...
60·9	·536	5·7	6·3	47·4	464·5	...	...	...	...	...	...	...	...	...	...	...	...
68·6	·702	7·6	2·0	79·2	468·2	...	...	...	...	...	...	...	...	...	...	...	...
67·6	·672	7·3	1·4	84·5	471·6	...	...	...	...	...	...	...	...	...	...	...	...
67·1	·664	7·2	1·4	83·5	472·4	...	...	...	...	...	...	...	...	...	...	...	...
66·8	·636	6·9	2·3	74·8	471·8	...	...	...	...	...	...	...	...	...	...	...	...
58·2	·486	5·2	5·7	47·6	467·0	...	...	...	...	...	...	...	...	...	...	...	...
57·0	·466	5·0	5·1	50·4	471·8	...	...	...	...	...	...	...	...	...	...	...	...
52·6	·397	4·3	5·4	43·9	473·3	...	...	...	...	...	...	...	...	...	...	...	...
58·4	·507	5·5	4·8	54·8	469·7	...	...	...	...	...	...	...	...	...	...	...	...

Long. 67° 2′ E.

52·6	·397	4·4	3·6	53·7	525·3	...	...	...	...	...	...	...	...	...	...	...	...
49·8	·358	3·9	4·7	45·6	522·6	...	...	...	...	...	...	...	...	...	...	...	...
58·2	·486	5·3	4·6	52·6	516·8	...	...	...	...	...	...	...	...	...	...	...	...
66·3	·646	6·9	5·0	57·6	508·5	...	...	...	...	...	...	...	...	...	...	...	...
71·2	·765	8·1	4·9	62·2	503·5	...	...	...	...	...	...	...	...	...	...	...	...
73·2	·814	8·5	5·9	58·9	496·7	...	...	...	...	...	...	...	...	...	...	...	...
75·1	·873	9·2	3·9	70·0	498·0	...	...	...	...	...	...	...	...	...	...	...	...
72·4	·794	8·5	3·9	68·0	502·1	...	...	...	...	...	...	...	...	...	...	...	...
71·3	·766	8·2	4·2	65·6	504·9	...	...	...	...	...	...	...	...	...	...	...	...
68·0	·686	7·3	4·6	61·5	509·5	...	...	...	...	...	...	...	...	...	...	...	...
50·1	·363	3·9	8·0	32·0	513·1	...	...	...	...	...	...	...	...	...	...	...	...
47·2	·334	3·7	4·3	42·9	524·6	...	...	...	...	...	...	...	...	...	...	...	...
62·9	·607	6·5	4·8	55·9	510·5	...	...	...	...	...	...	...	...	...	...	...	...

REPORT

OF THE

SANITARY BRANCH FOR 1864.

BY

T. G. LOGAN, M.D.,

INSPECTOR-GENERAL OF HOSPITALS AND HEAD OF THE SANITARY BRANCH.

TO THE DIRECTOR-GENERAL

OF THE

ARMY MEDICAL DEPARTMENT.

Sir,

I have the honour to submit to you the Report of the Sanitary Branch of the Army Medical Department for the year 1864.

The fact of Cholera having acquired so great and important an interest in England, at the present moment, has rendered it very desirable to publish in this volume, by anticipation, Reports on the Epidemics of 1865 in the Mediterranean Garrisons: that of Malta furnished by Dr. Leith Adams, Surgeon, and Mr. Welch, Assistant-Surgeon, of the 1st Battalion 22nd Foot; of Gibraltar, by Dr. Rutherford, Deputy Inspector-General: and, further on this subject, an extract, in connexion with the latter, regarding the outbreak of the disease in the ship "Renown," from Gibraltar to the Cape of Good Hope, by Deputy Inspector-General Mr. Lawson. Additionally will be found an interesting narrative bearing relation in sequence to the disease on board of the emigrant ship "England," given by Mr. Barrow, Deputy Inspector-General, Principal Medical Officer of the Nova Scotia Command. A Report of Assistant-Surgeon Martin, 45th Foot, on a severe epidemic visitation of cholera in a wing of his regiment at Neemuch is also contributed.

As the Mediterranean Commands have been so fully noticed in the special Reports alluded to, no further remarks on the sanitary condition of Malta and Gibraltar have been made under the head of Foreign Stations.

The Sanitary Report for New Zealand, not having arrived in time for insertion in this year's volume, will be published in that of next.

Other interesting subjects are afforded in the following contributed papers:—

I. A Medico-Topographical Report on Japan and the Garrison of occupation of Yokohama, by Dr. Woodward, Surgeon, 2nd Battalion 20th Regiment,

II. A Report on the Water Supply from the Wells within the Fort of Colombo, Ceylon, and from others of the Garrison, with Analyses, by Staff Assistant-Surgeon Dr. A. Martin.

III. A Report on the Ventilation of the Herbert Hospital, Woolwich; and on that of the Barrack-rooms, Guard-room, and Stables at Hilsea, by Dr. De Chaumont, Staff Surgeon.

IV. The Review of Professor Parkes, F.R.S., on the leading Sanitary subjects of the day, a contribution of varied and valuable information.

I have the honour to be,

Sir,

Your most obedient humble servant,

T. G. LOGAN,

Inspector-General.

6, *Whitehall Yard,*

August, 1866.

SANITARY REPORT FOR 1864.

THE HOME QUARTERS OF THE ARMY.

CAMP OF ALDERSHOT.

With the exception of scarlatina, which appeared as an epidemic among the children of the division, and was also prevalent in the neighbouring districts, no sickness or mortality requiring special notice was recorded at this station during the year.

The site of this camp retains its character of being salubrious, and the barracks and huts, although by no means free from considerable sanitary defects, still afford accommodation conducive to the health of the troops.

It would, therefore, seem superfluous, states the Principal Medical Officer, to do more on the present occasion, than very briefly to enumerate a few of the more prominent sanitary faults and deficiencies as they exist in the respective barracks and huts, in the former of which the problem of the ventilation, referred to in the Report of last year, had not yet been satisfactorily carrried out executively.

The rooms of the Permanent Infantry Barracks were, in consequence, frequently very close at night. The huts, without an extra supply of coal, are found to be extremely cold in winter, and when their doors and windows are shut, whilst, to a certain extent, they still remain uncomfortably cold, the inner atmosphere becomes close and at times offensive.

Objection has held to the quarters of the married soldiers in the apartments being too small, especially those of the Permanent Infantry Barracks, one room being in its dimensions quite insufficieut for the requirements of a family whereof there may be several children.

The means of warming and ventilating the guard rooms, lock-up rooms and cells, in the Permanent Infantry Barracks especially, would appear to require further improvements.

Were the new ventilating grates universally introduced, the supply of fuel for the barrack-rooms would suffice.

The present open ash pits might be advantageously replaced by iron bins of much smaller dimensions, and which could be conveniently cleared.

The ration supplies to the troops in camp by the Commissariat Department have been, as customarily, good. Vegetables, instead of being procured as heretofore by each company independently, are now obtained through regimental contract. This alteration has proved most successful, the vegetables being usually superior in quality, while a daily saving is gained to the soldier, varying from a farthing to a halfpenny.

The sanitary improvements have been as follows—

In course of the year recreation-rooms were erected in the camps, north and south, and appeared to be, in general, very well attended.

All the latrines attached to the Permanent Barracks, and in the South Camp, were being converted into water ones, on Jennings's principle.

The wooden huts for the married soldiers were in process of being divided into four private compartments, one for each family.

During the conversion of the latrines of the Permanent Barracks, the drains in connection with them were increased and improved.

In the North Camp a new drain was constructed in connection with the utilization of the camp sewage.

Owing to the presence of epidemic scarlatina among the soldiers' children, additional and special hospital accommodation was required, and obtained by the temporary removal of the sick of the Royal Engineers from the hospital

uts in Z to I lines, and by appropriation of the vacated hospital, for isolating he cases of the epidemic.

During the year venereal disease, with its numerous sequelæ, proved, on the whole, the most fruitful source of inefficiency, temporary as well as more or less permanent, among the troops at Aldershot.

The Gymnasium continued to prove most beneficial, and, indeed, an institution admirably calculated to develope the soldiers' physical efficiency ; the training has been conducted carefully, and with most favourable results.

THE WESTERN DISTRICT.

(Plymouth and Devonport.)

Dr. Annesley, Deputy Inspector-General of Hospitals, had to report very favourably on the sanitary condition of the troops in the Western District, consequent on the many hygienic improvements in their barrack accommodation.

Enthetic disease, he states, furnished by far the largest number of admissions to hospital, having been at the rate of 212·19 per 1000 of strength.

Of the several measures practised to reduce this bane of the service, the principal one of the year was the establishment of a lock hospital, further contributing to which end were the improved means for personal cleanliness furnished in barracks, the providing of recreative means for the men, and attractions to wean them from the low haunts in town, also imposing upon them in the way of punishment confinement to barracks on their being found to conceal venereal disease.

A suggestion is thrown out, that regiments arriving from foreign service should not at first be quartered in sea-port towns or garrisons, where the soldier is exposed to so much temptation.

The instance is cited of two regiments which were stationed at Portsmouth on their return from foreign service ; they had for nearly a month 40 men per 1,000 of strength constantly in hospital on account of venereal, whereas the number per 1,000 in other corps which had been for some years at home was only 16. This instance justifies the suggestion.

THE SOUTH-WESTERN DISTRICT.

Dr. Francis Innes, C.B., the Deputy Inspector-General of the South-Western District, reports the barracks to have been fairly ventilated generally, but varying much in the accommodation afforded in cubic and superficial feet per man. The troops were, as a rule, favourably circumstanced as to their diet, duties, clothing, accessories of ablution and means of cooking. Improvements of drainage, latrines, and urinals, with other sanitary services, were established at certain barracks and posts where, respectively, they had hitherto been defective.

Complaints, he states, had been made from various quarters of the insufficient means of warming the prison-rooms, in which men during inclement weather are liable to be confined, sometimes for more than forty-six hours, and when rendered peculiarly prone to succumb to cold by debauchery. The object may be to make these places of punishment as little comfortable as possible, but no doubt is entertained that, under the lowered physical condition after a debauch, health of individuals may be on occasions seriously endangered by this practice of the lock-up system, the more when it is considered that, not infrequently, it may happen that the man is committed to the cells, on his return to barracks, to pass the night in his damp or wet clothes.

The Hospital accommodation appears, generally, to have been fairly adequate to the requirements of the year ; in the garrison establishment of Portsmouth the average minimum of cubic space per bed was 720 feet, the average maximum 1,259.

On the sanitary condition of the towns of Portsmouth and Portsea, Dr. Innes has to comment very unfavourably, as follows :—

"Portsmouth and its suburbs are now believed to contain 100,000 souls on an area the highest point of which is only 12 feet above high water-mark, while a large portion ranges from 2 feet below to 5 feet above the tidal range. This area is not only undrained, but is honeycombed throughout with cess-pits, in which the water often rises within a few feet of the surface. The whole town is both undrained and undefecated, and the excretions of this large and rapidly increasing population are carefully stored in pits under our noses, or thrown into the ditches and dams of the fortifications, and into the creeks of the harbour. The only remedy for this is the formation of a system of intercepting drains emptied by steam pumps. It is very certain that, however costly it may be to execute these, it will be still more so to leave them undone."

With reference to this insanitary condition of the towns as reacting on the troops serving within the garrison, Dr. Innes draws a comparison, from the death rates of the year, much in favour of the corps stationed on the Gosport side of the harbour, almost in the country, and of the troops occupying the advanced forts removed from town influences. The circumstance appeared to him as indicative of the disparity being due more to the highly insanitary condition of the borough of Portsmouth itself than to anything remediable by military authority.

The "Contagious Diseases Prevention Act" came into operation in this garrison in the year under review, and Dr. Innes states it to have been worked so far judiciously and carefully. He reports of it thus:—

"A policeman calls every morning at each regimental hospital, and is placed in communication with any man who may have been admitted on account of venereal disease, with a view to ascertaining when and from whom the disease was contracted. In most cases the patients are willing to give what information they can on these points and, once possessed of this, the police are able to induce the woman indicated to go to the civil hospital for examination. About 65 per cent. of those examined are found to be diseased, and are taken under treatment. In consequence of these proceedings, many women have spontaneously sought and obtained admission into hospital. The working of this system is, at present, arrested by the whole of the beds (forty) in the certified hospital being filled, and, consequently, women known to be diseased are permitted to be at large, and these, in the absence of their professional competitors, spread the disease with increased rapidity. Under these circumstances, I think strenuous efforts should be made immediately to obtain (temporarily) the accommodation necessary for the reception of all the diseased women of the garrison, and for their retention until their cure has been completed. If this is not done, and that speedily, this measure, so important to the health, not of our sailors and soldiers only, but of the community generally, will infallibly break down. Independent of this difficulty, the Act is now worked at great disadvantage, as the Medical Officers of the hospitals are all unpaid, and it can hardly be expected that they will enter on the increased labours demanded of them under this Act with that cordial energy and zeal which their importance demands."

"It is on the house surgeons of the certified hospitals that the efficient working of the Act chiefly depends, and it would, I suspect, be well to hold out hope of reward to those who prove most successful in reducing the amount of enthetic disease in their respective stations. One great obstacle to the efficiency of the present arrangement is, that the Act only authorizes the detention of those women who are brought to hospital, while those who go there voluntarily leave at their pleasure, whether cured or not."

"The new law has not yet been long enough in operation to enable us to judge of its effects, but it is certain that many diseased women are now under treatment who would have been at large but for this Act, and this must in time do good."

SANITARY REPORT OF THE ROYAL VICTORIA HOSPITAL, NETLEY.

(For the Year ending December 31st, 1864.)

Submitted by Inspector-General Anderson, M.D.

During the year 1864, 3,745 patients have been admitted into the Royal Victoria Hospital. With a few exceptions, all have been invalided from abroad.

Invalids from Abroad	3,488
„ „ Home Stations	74
Men of Army Hospital Corps	149
Sailors of Turkish Navy	34
Total	3,745

The same arrangements in classing the patients in three divisions has been followed this year as last, and to this subject I shall not therefore refer.

The principal diseases have been those of men invalided from the tropics; and, as last year, there has been a preponderance of secondary syphilitic affections.

The climate of Netley has had no deleterious influence on the health of patients of either the medical or surgical division, and not a single case of disease could be traced to a local origin.

As in 1863, there have been no perceptible emanations of the slightest consequence from the mud, dry at low water, and the summer of the year 1864 having been extremely warm and dry, has afforded a fair proof that the reports of the prevalence of such exhalations have been much exaggerated.

Hospital Precincts.—During this year the ground within the boundary of the hospital has undergone a very marked improvement. The piles of bricks on which I had occasion to animadvert in my former report, have been completely removed; the space in which they stood has been ploughed, preparatory to being laid down in grass next spring; good roads have been made, and trees (cedars, lime-trees, hollies, &c.), have been planted along their sides. It is anticipated that, in a few weeks, the removal of the whole of the contractor's work-shops, saw-mills, &c., in front of the centre building of the hospital will be effected and the ground levelled, after which the laying out of the lawn in front will be completed. Five gate-houses have been erected, one at each of the principal entrances of the grounds. They are substantial, well-ventilated buildings, and are to be inhabited by non-commissioned officers.

Cemetery.—A piece of ground of about five acres has been this year laid out as a cemetery. It is at a convenient distance, separated by a wooded valley from the ground on which the hospital stands, and it cannot be seen from any part of the building. The soil is gravel, which can be easily turned up to any depth.

Cottages.—The cottages for the families of invalids and men of the Army Hospital Corps have been completed, and they are now occupied. They are well ventilated—indeed, complaints have been made that they are rather too airy in a south-westerly gale,—and the accommodation has as yet been found sufficient. In the winter, when the invalids and their families were few, the spare cottages were inhabited by candidates attending the Army Medical School.

Behind the hospital, one row of the huts that were put up for the contractor's workmen has been removed, and I have recommended (with the exception of one required at present for a canteen) that the others should be pulled down, and the ground properly drained.

Officers' Quarters.—A considerable addition has been made to the right wing of the officers' quarters, kitchens and sleeping-apartments having been put up for the servants of the Staff Surgeons, and porches erected at the doors in front, with a view of in some measure breaking the force of the occasional very high winds. No improvement has as yet been made in the ventilation of the

rooms occupied by the junior officers, but the number of sick among the occupants has not been so great as it was last year.

Hospital Precincts.—The courts behind the hospital have been drained, and the broken bank outside the walls is being levelled. In another year I have no doubt the whole of this space will be clear of the huts, lime-kilns, and heaps of rubbish accumulated during the erection of the building.

Drainage.—The drainage of the hospital is good. The ashes and refuse are carted off twice a-day. The latrines and urinals are clean, being flushed twice daily.

Barracks of Army Hospital Corps.—The well-ventilated barracks of the men of the Army Hospital Corps are kept scrupulously clean, and hitherto they have not been overcrowded. The appliances for ablution are ample, and there has been a plentiful supply of water.

Cells, &c.—Neither cells nor guard-room are much used, but both buildings are sufficiently airy. This remark applies equally to the school-room. There is no separate reading-room for the orderlies.

Amusements.—The amusements are not so numerous as could be wished. There is a large reading-room in the hospital, but it is very dark and gloomy in bad weather. There are also skittle-alleys, two uncovered in front, and one in a very substantial building lately erected behind the church. Quoits afford means of amusement to the convalescents and orderlies, and to the latter cricket and foot-ball, a new cricket-ground having been laid down in front of the hospital. The proposal for a gymnasium has, I believe, been sanctioned, and, when put up, it will be of great advantage to both officers and men. The former will have then practical experience of those exercises, and will be better able to judge of the extent young soldiers may safely be drilled in the gymnasia. Lectures on interesting subjects, and illustrated by the magic-lantern, have been given by the schoolmaster.

Water Supply.—Water is supplied to the hospital from three Artesian wells and a large reservoir. One of these wells is behind either wing of the hospital, is 175 feet in depth, and furnishes about 33⅓ gallons per minute. The third is at the laundry, and is the source from which that establishment is supplied.

Water for ablution purposes is conveyed through pipes from a large reservoir about a mile and a-half off. This receptacle has been considerably deepened during the year, and contains, when full, 3,000,000 gallons. It is filled by the natural drainage from the high grounds and its vicinity.

I give my friend Dr. de Chaumont's analysis of the water from the Artesian wells and from the reservoir.

ANALYSIS of Tap-water from South Wing Well, Royal Victoria Hospital.

			Grs. per Gallon.
Carbonate of Lime (Volumetric)			2·450
Sulphate of Lime			3·808
Carbonate of Magnesia			1·176
Sulphate of Soda			1·562
Organic Matter	By Volumetric ·996	Mean	1·068
	By Incineration 1·140		
Chloride of Sodium			2·910
Suspended Matters			·916
Iron, Silica, and Loss			·042
Total Solids			13·932
Do. Evaporation			13·932
Carbonic Acid			1·848

or 3·91 cubic inches per gallon.

N.B.—The water varies considerably from time to time, but the above is about the maximum that has been observed.

ANALYSIS of the Reservoir Water.

	Grs. per Gallon.
Carbonate of Lime..	·595
Sulphate of Lime	1·428
Carbonate of Magnesia	·600
Chloride of Sodium	2·100
Organic Matter	1·837
Total Solids	6·560
Iron, Silica, Suspended Matter, and Loss ..	·965
Total Solids by Evaporation..	7·525

Hospital, interior of.—Another year's experience confirms me in the opinion I formerly expressed, that the corridor arrangement, though objectionable in a hospital where infectious diseases are treated, is by no means so in one where invalids from Her Majesty's colonies are the patients, as a large majority of those men are not only not confined to their beds, but during the greater portion of the day, in fine weather, are not in their wards; and in the very bad weather, when open-air exercise is denied them, they have the spacious well-ventilated corridors to walk about in. To the Parian cement-lining the walls of the lobbies and staircases I have still the same objection; on a dull wet day nothing can have a more depressing or chilling effect upon men invalided from tropical climates, than the streams of water running down the walls. That in the corridors and wards has not this objection, as the warmth prevents the condensation of the moisture; but the permanent discolouration of the walls of the wards, from the manner in which the cement has been applied over a coating of dark clay, is very unsightly.

Baths.—The large swimming-bath has been much frequented during the summer. The water is forced into it at high-water from the estuary by a pump, the motive power of which is a small windmill. This can only be effected when the wind is pretty strong, and this is not often the case during the extreme heat of the summer. A steam-engine of small power would be much better adapted for this purpose. When the pump acts, the quantity thrown into the bath, which holds 32,000 gallons, is about 18 gallons a minute. The baths in the wards and those in the rooms off the swimming-bath have been at all times well supplied with water.

Pier.—Nothing is more required at the Royal Victoria Hospital than the erection of a proper pier, at which men could be landed at all states of the tides; though hitherto the invalids coming ashore have had tolerable weather, still if brought round from Spithead in a stormy or a rainy day, phthisical cases, and men in delicate health, must suffer greatly.

SOUTH-EASTERN DISTRICT AND SHORNCLIFFE CAMP.

DEPUTY-INSPECTOR-GENERAL DR. GEORGE TAYLOR has furnished a Report on the military establishments of the South-Eastern District of England, over which he has been the Superintending Medical Officer. The report forms a valuable one of reference on the details of the barracks and hospitals. Limitation of space, however, necessarily restricts notice of it to the sanitary progress and improvements which have been more recently effected, and those principally during the year under review, at the respective stations of the division.

Shorncliffe Camp.—Here the married soldiers' huts had been very insufficient and unsatisfactory, each being allotted to the occupation of four and five families without a partition but that of a simple curtain screening each family. Several of these huts have been formed into four compartments by permanent divisions, each compartment obtaining its small fire-place with cooking means, much to the convenience and comfort of the married soldiers; and the remaining huts were in course of similar conversion.

A recommendation of the Director-General for the improvement of the ward windows of the hospital, by having them reconstructed, was in process of carrying out, and will contribute much to the measure of regulating and improving the ventilation of the wards at all seasons and states of weather.

No epidemic disease occurred among the troops in camp, although small-pox was considerably prevalent at one time in the neighbouring town, Sandgate, and the sanitary condition of troops could not well have been more steadily satisfactory than at this salubrious station, the per centage of sick among them not having exceeded an average of 4·32 for the year.

Dover.—The Castle. The old barracks of the Keep Yard, of Dover Castle, came under re-appropriation as to occupancy by the troops, and the measure resulted in an effectual cessation of what previously had been overcrowding. It is not to be expected, however, Dr. Taylor states, that any addition to, or alteration of, these inclosed barracks will ever make them eligible, although it is admitted that much has been done of late years to improve the ventilation of the rooms.

With reference to the long tunnel-shaped casemates of the castle, much, it is reported, had been done to obviate the wafting into them of odours from their urinals, which latter are situated between them and the sea face of the cliff, in consequence of which position these odours permeated the intervening corridors, and were a nuisance within the casemate-rooms; the urinals yet required the application of a constant flushing power.

As the hospital of Dover Castle has to meet the necessities not only of the troops within that fortress, but of others (Royal Artillery) in detached forts, it has not been possible to re-appropriate it in cubic estimates per patient, correspondingly with the relative barracks, and it must be pronounced that the wards are still contingent to overcrowding, the complement remains fixed at fifty-six beds, whereas the numbers which the building should contain at 1,200 cubic feet would be thirty only, an appropriation which could only provide for 3·1 per cent. of the strength.

The Citadel of Dover.—In this commanding position, 450 feet or so above the sea, the barrack-rooms, all casemated, are many of them damp, and more or less dark. A great desideratum for them, Dr. Taylor states, is a supply of the new ventilating grates, which diffuse a warmth, create a comfort, and effect an economy, strongly contrasting with the old and wasteful ones.

The Deputy-Inspector-General has much to praise in the new South Front Casemated Barrack, which he characterizes as a master piece of military with sanitary engineering, the latter being here admirably carried out in this description of barrack construction, all the modern improvements in ventilation, warming, and lighting having been effected, and which give to the rooms an airy, light, and comfortable appearance. The several accessories, too, cook-houses, lavatories with baths, water latrines, urinals, &c., are all of excellent provision.

Dr. Taylor's further remarks apply principally to the defective hospital accommodation for the sick of the troops occupying the Citadel and Western Heights Barracks. The hospital of these heights has so many inherent defects that nothing short of a reconstruction would remedy them. It is greatly deficient in accommodation as to cubic and superficial space for ordinary cases, and requires an itch and an infection ward, also greatly proper bath and lavatory apartments. Its general accommodation is quite inadequate for the proper convenience of the sick of two regiments which it frequently happens have just returned from Indian or tropical service. Bearing on this latter point, Dr. Taylor well remarks that Dover appears to be a very ineligible station for regiments just returned from such service, on account of the steep ascents to their barracks and the fatigues inseparable from their marches and garrison duties being very trying to the many enervated men.

Walmer.—The frontage of the barracks at this station is, as Dr. Taylor states, unfortunately intercepted from the beneficial influences of sea breezes by a civil population living in houses surrounded by every insanitary condition of cess-pits, pig-styes, &c. This state of the vicinity has been repeatedly and urgently brought to the notice of the local municipal authorities by the military, and with the result at length that the Board of Guardians have consented to place Walmer under the Board of Health for sanitary jurisdiction.

These barracks have of recent years been placed on very satisfactory footing as to artificial ventilation, water supply, drainage, &c., and it has been recommended that quarters should be established specially for the families of the married soldiers, for whose convenience and necessity a new wash-house and laundry are much required.

Canterbury.—New barracks for the married soldiers were completed and taken into occupation this year (1864). In rear of them have been constructed a large wash-house and laundry. The range of these quarters is well circumstanced in respect of ventilation, and all the domestic accessories necessary for the comfort of this class are very perfect, rendering the establishment one of the greatest boons conferred on the married soldiers. In respect of the garrison hospital at this station, the kitchen department has been much improved, ward accommodation extended, water-closets, latrines, and urinals have been placed on better principles, water supply has been increased, and an itch ward and new post-mortem room have been provided. The ventilation, lighting, and warming of the hospital have been improved, indeed the whole establishment within the last two or three years has been rendered a very complete one.

CHATHAM AND DISTRICT.

THE Principal Medical Officer raised the suggestion whether it was not desirable to adopt some compulsory regulation as to the wearing of flannel underclothing, particularly among the constituency of the garrison of Chatham. It was observed to be worn by some and not by others, to be almost of universal wear in some corps, and indeed enforced, whilst in others neglected and almost discouraged. Whilst it was a regulated article of hospital clothing, the occurrence might be that a man who had been suffering from dangerous chest affection, and when in the hospital clothed in flannel, would be discharged on recovery with nothing but his thin cotton shirt; what wonder then, observes Dr. Fraser, Deputy Inspector-General, if that man soon returned with a relapse of bronchitis, pneumonia, or pleurisy, or with rapidly developing symptoms of phthisis.*

Sanitary Improvements:—These were considerable during the past year, and chiefly at Chatham.

Here increased cubic space had been satisfactorily obtained, from having been so limited as only about 350 feet per man it now averaged 500 and upwards, and would soon, the Deputy Inspector-General had no doubt, reach the regulated 600 in barracks. In the hospital it had averaged the regulated 1,200, and often much more was available.

At Sheerness the cubic space was in practice 1,200 feet, as the wards were never full. They are now allotted at 1,200 per bed.

Increased Facilities for Ablution.—Improvements in this respect had been recommended for the Chatham Barracks by a Sanitary Committee, but had not yet been carried out.

Means of Cooking did not seem to require improvement, generally speaking.

Drainage had been, and continues, under improvement at Sheerness. Latrines were remodelled with properly constructed flushing apparatus at Maidstone, and in some instances at Sheerness.

WOOLWICH GARRISON.

DR. CHAMBERS, Deputy Inspector-Geueral, reported in a general way of the very satisfactory sanitary condition of the garrison throughout the year.

The barracks were not over crowded, and there was a fair amount of cubic space available for each man; great cleanliness was maintained within and without; the new artificial system of ventilation conducing to the satisfactory state of health among the troops.

* A recent Horse Guard's Order has made the flannel shirt a compulsory article of the recruit's kit.

Some few of the barrack-rooms had to be occupied as married quarters (three or four families to each room), an objectionable and uncomfortable arrangement, bespeaking the necessity of an increase of the number of special quarters for the families, similar to the "Cambridge Cottages" constructed for them within late years. The rooms on the basement floor of the main barracks were vacated at the early part of this year, as accommodation for the troops, on account of being low and dark, and partly under ground; they became appropriated for barrack stores and similar uses.

The rations and clothing of the troops proved all in keeping with health; good supervision was held to maintain all the barrack accessories, kitchens, ablution and bath-rooms, latrines, urinals, &c., in effective and orderly condition.

By the Tables of sickness and mortality it is shewn that in this large garrison, with its populous neighbourhood, there was much exemption from disease during the year, and singularly so from small-pox, of which only two cases occurred among the men.

EASTERN DISTRICT.

THE following Report on the barracks at Colchester, lately constructed for a regiment of cavalry, is given by Dr. Dane, Deputy Inspector-General of this district.

A report on the new barracks at this station seems desirable, not only from the fact that they have been lately erected, but also that their formation is an indication of the comfort now deemed necessary for the welfare of the soldier; and, moreover, as these barracks will afford an excellent opportunity to test the question how far the health of the cavalry soldier is affected by residence over troop stables, as compared with residence in quarters detached from these.

The site of the barracks lies at a short distance to the south of the town of Colchester, on the River Colne, in the eastern part of Essex, eight miles distant from the sea.

The ground selected for the location of a cavalry regiment at this station is named the Abbey Farm, at an elevation above the sea of 109 feet, an open and clear position.

The surrounding country is highly cultivated, though not of an interesting aspect, generally well drained, and presenting no sources of malaria in the immediate vicinity of the barracks. Intermittent fever (formerly a common disease of the vicinity) may now be said to be unknown, and the former influence of the locality is only recognised in the periodicity which other diseases occasionally assume, and the cases of neuralgia which are at times seen among the badly conditioned classes residing in ill drained and low situations. The more elevated plateau, on which the present camp and barracks of Colchester are placed, seems well suited to ward off all complaints of the zymotic class, and experience would lead to the conviction that there can scarcely be a more healthy station for troops under ordinary circumstances, with the excepted instance of the often serious influence it exercises on those predisposed to chest affections.

The soil of the country around varies from sand to gravel, and occasionally to loam or clay; that about the barracks is black loam about 2 feet deep, lying on gravel 18 inches in depth, with a bed of sand underneath.

The fall of the ground towards the town would seem to point out that nothing could be more easy than to remove the surface water from around the barracks, but the system of drainage has not yet been effectively carried out over the entire area of the site.

I may state that the main-sewer of the barracks runs along the western boundary and, from the northern end of the same, branches off in an easterly direction to the sand pit at the lowest part of the Abbey Field, where it joins the town sewers; the slope of the barrack sewer is 1 foot in 150, and this will admit of perfect drainage when the smaller arterial branches connected with it are completed.

Water is supplied by a company: the source is an artesian well from the

lower chalk formation, and the water is conveyed to a reservoir in the immediate vicinity of the barracks. At times the supply has been irregular to the more distant buildings, owing, it is thought, to the insufficient height of the building erected for the tank, and a consequent deficient pressure from the water-tower to effect distribution through the pipes.

The quality of the water has been pronounced, under a careful analysis, excellent for drinking purposes, and from its softness well suited for other domestic uses. The smallest traces of organic matter, of the sulphates and of iron, were found to be present; the chlorides, though somewhat abundant, not present to an extent likely to be in any degree injurious to health.

Having thus endeavoured to give the general details connected with the locality, I may describe the barracks as they exist at present, premising that some of the quarters for the married soldiers are not yet finished.

The buildings occupy a rectangular allotment of ground at the western limit of the farm land before named, and cover a large space, the officers' quarters being at the southern, and the quarters of the married soldiers at the northern extremity, the intermediate space being taken up by the troop blocks, the detached stables, officers' stables, staff serjeants' quarters, recreation-rooms, riding school, &c.

The officers' quarters consist of two blocks of buildings two stories in height, and are separated from the mess establishment by a 7 feet covered passage on either side; they are subdivided into houses, and are lettered from A to K. Round the front of the whole is a 7 feet verandah. They are substantially built of brick, and are ventilated by the doors and windows, the discharge of air being by the chimney. The rooms are warmed by the new ventilating grates.

Immediately to the left of the officers' quarters are four blocks of soldiers' rooms, these are lettered A, B, C, and D, and are built on an uniform plan, all have similar conveniences, and are of the same dimensions. They are detached from the stables, run parallel to each other, facing the south, and between B and C buildings is placed the cook-house for the four blocks.

The latrines, common to them, are behind the stables to the west, as are also the baths.

Each block is 170 feet in length and 35 in breadth, is subdivided into four large rooms, two on the ground floor with two serjeants' rooms, and two on an upper story with two serjeants' rooms also. In the centre of each block is a hall, with the staircase leading to the rooms above; each room is calculated to accommodate 18 men. The rooms are $53\frac{7}{12}$ feet in length, 20 feet in breadth, and the height of the walls is $10\frac{7}{12}$ feet, giving, when fully occupied, a space of 630 cubic feet, and a superficial area of 60 feet to each occupant. There are eight windows to each room, 7 feet by 4 feet, four on each side, and the means of ventilation are by the doors and windows, and five Sheringham's valve ventilators at the top of the walls, three of these in one wall and two in the other, whilst there are two outlets 18 by 9 inches, one at the end of each room for the discharge of foul air. Extending round the base of the buildings there is a course of ventilating bricks, giving entrance to the external air underneath the floors, but not communicating with the rooms. At the extremity of each room, and entered from it, there is a pantry, a lavatory, an urinal, and water-closet for night purposes. The lavatories are each fitted with basins for ordinary ablutions, and two foot-baths.

The four serjeants' rooms are each 12 feet square, the height of the wall being 10 feet, giving a space of 1,440 cubic feet to the occupants. These rooms have each one outer window, and also a smaller one looking into the mens' rooms, to enable the non-commissioned officers to exercise supervision and control.

The system of lighting the troop rooms is by gas.

The rooms are heated by the new pattern ventilating grate.

In front of each block there is a 7 feet verandah, which is very advantageous in wet weather.

Next comes the staff serjeants' barrack, which is a block facing the west, running north and south to the left of the before described soldiers' quarters, and is subdivided into three houses, each constructed for occupation by four families, having, respectively, a sitting and bed room; the building is of two

stories. The size of each room is 16 feet in length, 14 in breadth, and 9 feet 6 inches in height; the room is ventilated by an inlet opening, and by an outlet shaft. The fire-places of these quarters are fitted with kitchen ranges. Water is laid on to each, and underneath the staircases are sinks. These rooms and passages are lighted by gas.

At a distance of 200 feet from the north end of the staff serjeants' quarters is E troop block, this and the following three, F, G, and H, are built on a different plan to the four other blocks of mens' rooms, being over the stables and facing east and west, with an interval of 120 feet between each block. These four buildings are somewhat larger than the four detached from the stables, being 200 feet in length, and 45 feet in breadth; they are approached by a staircase at the north and south ends, and have a 6 feet verandah to the east and west. They are all subdivided into four large rooms, each 45 feet in length, 29 in breadth, and 14 in height, and, as they are intended to accommodate eighteen men respectively, when fully occupied, each man has 1,015 feet of cubic space, with a superficial area of 72½ square feet. They are warmed, lighted, and ventilated as the others.

There are five windows in each room, one on each side of the door, which opens from the verandah, and three in the back wall.

In these buildings there are no water-closets for night use, but each room has an urinal.

There are four serjeants' rooms comprised in these blocks, each 18 feet in length, 18 in breadth, and 14 in height, giving a cubic space of 4,536 feet to the inmates or family.

In the centre of each building is the ablution room, which is 45 feet in length, 29 feet in breadth, and 14 feet in height, lighted by one large window. There is a small bath place in three of the angles of this lavatory.

The stables underneath these four blocks are each intended to accommodate sixty horses. They are well ventilated by inlets at the top of the walls over the windows, the foul air being carried off by shafts in the party walls and which open at the sides of the chimneys of the mens' rooms above, in the roof of the building. There are also ventilating bricks at the base of the buildings.

The floors of the stables are paved with Staffordshire vitrified brick, and there are numerous gutters to allow the urine to flow outside to the drains. The stables are lighted by gas.

At the north end of F block is the cook-house for the four troops occupying these quarters over the stables. The latrines and urinals for their use are at the north end of G block, in a line with the cook-house, but at a distance of 45 feet from it.

The quarters of the married soldiers come next. There are three blocks of these built for forty-four families, each family having one room 14 feet long, 12 feet broad, and 9 feet 6 inches high. The rooms have each two windows, are ventilated by one inlet and one outlet ventilator, and are lighted with gas. Each married soldier's room is provided with a small kitchen-range. These blocks of family quarters have a lower and upper story, a 6 feet verandah running in front of each. To every room there is a door opening off the verandah. A and B blocks are finished, but the block C is to have added to it two more quarters on the ground floor, and above these there is to be a female hospital apartment, to contain eight beds, with a room for a matron. To the east of the married quarters are provided two bath-rooms, one for the married men, the other for the women, each bath-room containing two baths. Attached to these bath-rooms are four water-closets for the women, and five, with two urinals, for the married men.

On a vacant space of ground near the B block of married quarters, to the north of the soldiers' blocks, is situated the water-tank for the barracks, and, also to the north of the same block, are the laundry and washing-house. The washing-house is supplied with rain water from a tank 50 feet long, 23 feet broad, and 9 feet deep.

To the south of H block of the soldiers' barracks is placed the Recreation establishment. This building has a ground floor and upper story, and faces east, it is 120 feet long by 23 feet broad. In it are the school room, serjeants' mess, kitchen, and two pantries on the ground floor, and up stairs the coffee room, reading room, library, cook's room, and two rooms for the librarian,

The forge, armourer's shop, quarter-master's stores, saddlers' and tailors' shops, &c., are placed to the west, and in rear of the recreation room. The quarter guard with the lock-up and solitary cells, are situated in the rear centre of the barracks.

Proceeding towards the south, in a line with the urinals, are the baths for the four troops occupying the blocks detached from the stables A, B, C, and D. They consist of two for the serjeants, and six for the privates.

The detached stables are separated from the soldiers' rooms by the main road which runs through the barrack area, and are four in number, corresponding to the mens' blocks. Each stable is 200 feet in length, 40 feet in breadth, and 16½ feet in height, constructed for fifty-six horses, twenty-eight a side, with a party-wall running down the centre of the building. There are three doors on each side, and two at either end. There are twelve windows placed high up in the walls on each side, with six smaller ones over the side doors. The ventilation of these stables is by the doors and windows, with an outlet above each window. There is also ridge ventilation. At the ends of the blocks are the store rooms. The roofs of the stables are slated, with the exception of the upper half of the north sides, which is formed of glass. At the extreme south of all the barrack buildings are the infirmary stables and the forge.

The whole of these new barracks is lighted by gas.

The cook-houses, two in number, one for each wing of the barracks, appear to be ample for the purpose They are fitted with all the modern improved appliances for cooking, and every required variety can be supplied from them.

Having thus endeavoured to describe the buildings, I may draw attention to some defects of a character, which may influence the health of the troops, and refer to others which were rectified at my suggestion, and have, so far as I can learn, led to satisfactory results.

The excessive ridge ventilation in the men's reading room, extending the entire length of the roof, and which admitted draughts of cold air in excess, has been moderated by valves.

The sink in each room of the staff-serjeants' quarters gave rise to most offensive effluvia at times, and has been removed, one general sink having been placed under the stairs in the entrance hall or passage, thus meeting the wants of the residents without inducing a nuisance. A coincidence worthy of notice occurred, in regard to these rooms at the time the sinks existed in them, viz., that more cases of scarlatina, in proportion to the number of residents, were admitted to hospital from this building than from the crowded huts of the married families in camp.

The admirably arranged ablution rooms of the blocks over the stables might with benefit be supplemented by some water-closet accommodation (for night use only), in the prevalent raw winds from the east chest affections will, no doubt, often arise from the exposure of men passing to latrines at some distance from the dormitories, it is to be regretted such was overlooked.

To render the baths and ablution rooms of full value in cold weather, hot water should be laid on at certain hours of the day for the use of the troops.

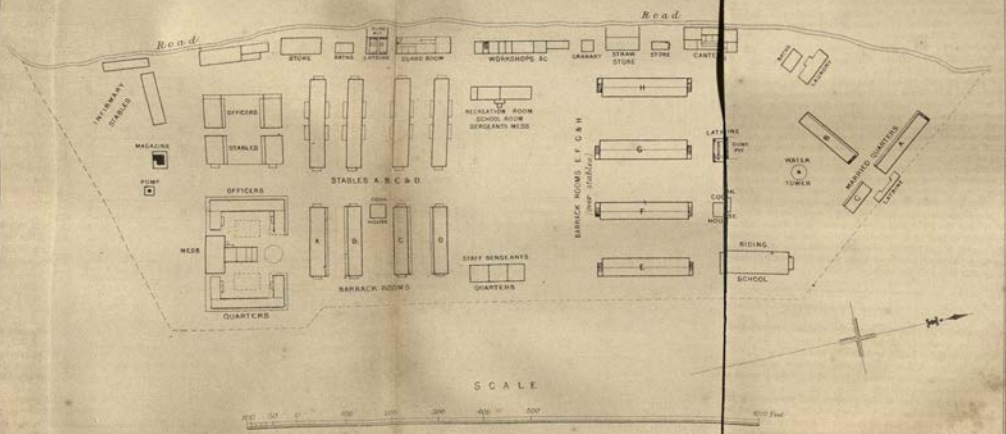
The grates in the barrack rooms detached from the stables are found not to diffuse heat adequately to the remote parts of these large rooms, a second grate would appear requisite for each.

NORTH BRITAIN.

Dr. Currie, C.B., Deputy Inspector-General, reports the average strength of the troops quartered in Scotland, this year, to have been 3,387, and the admissions to hospital 3,073, or at a sick rate 907·3 per 1,000, the average daily rate thereof being so low as 3·8 per cent., and that of the annual mortality 10·3 per 1,000 of strength, very satisfactory results of the general sanitary conditions under which the troops existed.

Adverting to the state of the barracks and hospitals in the Command, it is shown that, while few can be pronounced very good, most have been, more or less, improved of recent years in respect of sanitary requirements, and increased cubic accommodation has been given wherever practicable to do so.

PLAN OF
NEW CAVALRY BARRACKS
COLCHESTER.



The amount of individual accommodation in the barrack rooms necessarily varied at different stations, it is shown tabularly :—

Stations.	Superficial Area.	Cubic Space.
	Sq. Feet.	Feet.
Edinburgh Castle	45	495
Piershill	54	486
Leith Fort	42	400
Glasgow	62	600
Hamilton	56	515
Ayr	67	670
Paisley	60	690
Perth	71	623
Stirling	53	633
Aberdeen	48	450

An average for the Command of 55 square feet of floor space, and 558 cubic feet of air space.

With reference to the barracks of Edinburgh Castle, Dr. Currie has found it yet impossible to report very favourably of their sanitary condition, through original causes which cannot be easily remedied.

In the low, narrow, and badly lighted rooms of what are distinguished as the "old barracks" of the Castle, it is experienced that much improvement has been effected by the introduction of the new ventilating grates, air inlets, and extraction shafts, and these services were proposed for the new barracks in the next financial year, a very desirable end, as in the rooms of these the men are usually and unavoidably the more crowded. In the course of the last few months of the year, an important addition was made to the general accommodation by reconstructing the large barrack which joins the north side of the old palace, and forms a side of the upper quadrangle, this barrack having been dismantled a few years ago ; it will now provide for 138 men at 539 cubic feet, and 53 of floor space per bed.

The hospital accommodation of the Castle was sufficient for the requirements of the year and, considering the antiquity and originally non-adapted character of the building, met all purposes very fairly.

Respecting the cavalry barracks at Piershill, Dr. Currie considers that their sanitary condition may now be deemed, generally speaking, good, improved means of ventilation and warming having been introduced into all the rooms ; but, to give due effect to such improvements, the number of occupants required yet to be reduced, the still existing allotment at 486 cubic feet per bed being obviously inadequate. With this exception, and the shifting of the door of each room to the end furthest from the fire-place, the more important improvements recommended by the Barrack and Hospital Commission had been carried into effect, in which general satisfactory statement are included those of the guard room, prison cells, ablution rooms, cooking and wash-houses, the provision of baths, the construction of a laundry, the improvement of drainage, and the remodelling of latrines and urinals. The sanitary condition of Piershill Hospital, and of its accessories, was in every respect satisfactory, and the patients received nearly 1,000 feet of cubic space per bed, during the year, a close advance to the new regulation allotment.

One of the greatest social boons was soon to be realized by the construction, within the barrack area, of married soldiers' quarters to accommodate twenty-eight families ; the buildings at the time of report were in a forward state, and they were much required, greatly on account of the distance of Piershill from town.

At Leith Fort the health of both batteries of Artillery was very good, although these troops were limited to 400 cubic and 42 superficial feet per bed ; but the rooms were well lighted, warmed, and ventilated, thus tending to secure the good health referred to ; new and sufficient means of personal cleanliness were also afforded. The accommodation for the sick of this fort was good and ample for the year, and the hospital had been furnished in a very

complete manner with bath and ablution accommodation, the deficiency of which had long been a source of discomfort and inconvenience.

At Glasgow, under the uncertain duration of the tenure of the old Infantry barracks, no improvements of a sanitary nature were undertaken. The troops in occupation of them remained healthy, greatly in consequence of the liberal cubic space allotted to them in the rooms. The accommodation for the sick was ample, and offered no special sanitary objection.

In consequence of the small average strength of the detachments occupying the Paisley Barracks, the amount of accommodation was comparatively great, and the men were very healthy throughout.

At Ayr the barracks are now, in all the more essential sanitary requisites, reported to be the most complete in North Britain. They were occupied by detachments for musketry practice in succession, and all the conditions of health were secured by good sanitary accommodation and the light nature of the duties.

Although the sick rate at Hamilton was somewhat high amongst the detachments of cavalry, no specific diseases appear to have prevailed to any extent, with the exception that in November and towards the end of the year several cases of small-pox occurred amongst the men, the disease being prevalent at the time amongst the civil population of the neighbouring town. The cases of the military could not be associated with any insanitary condition of the barracks. Baths for the troops were still a great want here, however.

The sanitary condition and accommodation of the barrack rooms of Stirling Castle were found to be greatly inproved by the removal of the old galleries which darkened them, and by the introduction of efficient means of warming and of artificial ventilation; the hospital, although an old and converted building, afforded good and ample accommodation.

At the detachment station of Perth, the rooms of the Infantry were provided with the new artificial system of ventilation and warming, and the general state of the drainage of the barracks and yard, which had been so defective as to be a source of nuisance, was rectified by opening and thorough cleansing.

In Aberdeen the barracks were a good deal over crowded under existing arrangements, the cubic space allotted per man having been only of the old standard, 450 feet, as nearly as the average could be taken in a Depôt Battalion where the strength so frequently fluctuates. Adverting to the sanitary condition of the rooms, it is stated that important improvements had been recently effected as regards the system of ventilation and warming. In respect of hospital accommodation, Dr. Currie pronounces the establishment here to be the best of the military ones in Scotland.

IRELAND.

The Dublin Division and Northern District.

By the Report of Mr. O'Flaherty, Deputy Inspector-General of the Dublin Division, it is shown that during 1864 the following sanitary improvements were effected in his district. Increased cubic accommodation was provided in the Belfast, Longford, and Belturbet Barracks and Hospitals, also at Ship Street Barrack and Hospital, and the General Hospital, Phœnix Park, Dublin.

The new artificial system of ventilation, and the new ventilating fire-grates, were established in the Hospitals at Longford and Belturbet, as well as in the barrack rooms of Ship Street (Dublin), Dundalk, Longford, Newry, and Belturbet.

New ablution and bath rooms were constructed in the barracks at Portobello, in the Military Train Barracks, Arbor Hill (Dublin), and bath accommodation was added to the men's barracks at Belfast.

New ovens and steel boilers were provided in the kitchens of all the barracks in Dublin, and in those of Belfast, Longford, Dundalk, and Athlone.

New married quarters and an excellent laundry were completed and taken into occupation at the Royal Barracks, Dublin, and some of the huts in Belfast

Barracks were reconstructed so as to afford accommodation for four married soldiers' families, furnishing a fire-place to each family.

The scale of soldiers' rations had not been altered in the year, but the bread was now baked by the Commissariat Corps, and the meat killed and distributed by them, to the enhanced advantage of the soldier serving in this country.

The new canteen system was most successfully tried and worked in the late Depôt Battalion at Athlone, and a recreation and reading room were also provided and attended by such numbers of the men as could leave no doubt of the benefits from and success of the newly adopted system, evidencing the desirableness of its general institution.

The clothing of the troops had not been altered, but flannel shirts were supplied to the regimental stores, so that any soldier wishing to use them can now do so, and obtain them at a moderate cost, a preliminary to their eventually very general wear by the men it may be hoped.

On the measure of drainage, the Deputy Inspector-General had pointedly to complain of that of the barrack site and yard at Enniskillen as being very defective. Efforts had been made by cutting trenches to remedy this defect, but, the surface of the barrack-yard being nearly upon the level of the adjoining lake (Loch Erne), a thorough surface drainage is said to remain a difficulty.

The vicinity of the barracks in Enniskillen is still complained of, there being no main sewer, or even proper surface drains from the houses in the main street leading to the principal barracks. A report had gained currency that the civil power had provided funds to carry out the necessary drainage improvements of this portion of the town immediately joining the barracks.

With reference to the Curragh Division and the Central and Southern Districts of Ireland, little information of sanitary importance or progress is given this year, further than that, with respect to the latter two, grants from the annual estimates were to be applied to carrying out improved ventilation and warming of the barracks and hospitals, providing lavatories and bath establishments, improving means of cooking, remodelling latrines, &c., all which cardinal sanitary measures had stood over awaiting ways and means.

At the Curragh Camp a field hammock, lately designed by Captain MccGwire, of the Royal Regiment, was tested practically last year, and was thought to possess so many advantages over the ordinary field blanket supplied to the soldier that a question was submitted for consideration as to how far it was suited to supersede the latter on a campaign, or when troops are tented in standing camps, or for the use of the sick in hospital marquees.

The Report on this proposed article of field equipment by the then Principal Medical Officer of the camp, Staff Surgeon-Major Dr. Ord Mac-Kenzie, is as follows:—

"A. The field hammock consists of blanket materials, much strengthened by a non-elastic and durable substance, thus combining warmth and strength.

"B. It may be used either as a blanket or as a hammock and covering, two-thirds of the width forming the hammock, the remainder the covering.

"C. It may be pitched either in a tent or in the open without tents, so that a soldier has a bed at once ready for him, and carried by himself.

"D. The hammock complete consists of the hammock proper, two staves (26 inches high) and four pegs and cords, the extra weight over the ordinary field blanket being under 3 lbs., while the whole can be quite as neatly folded on and fastened to the knapsack.

"E. The staves are made of the best red deal and, though so light as not to weigh more than 5 ounces each, they are so strong, when placed at the angle necessary to sling the hammock, that they are capable of bearing the weight of three men, each weighing 11 to 12 stone.

"F. By increasing the radius of the ordinary bell tents 8 inches, ten men can readily be accommodated in each tent. The heads of the hammocks (which are outwards) are 40 inches apart.

"G. They can be put up in a very short time. Thus a tent can be very readily pitched, and ten hammocks slung, and their occupants all in bed in 8½ minutes.

"From the above I submit that the advantages, in a sanitary point of view, are simple and clear.

"1. A hammock is under any circumstances more comfortable than the ground, wet or dry.

"2. The soldier carries his bed with him and can pitch it anywhere, under cover or not.

"3. The bed can be pitched in a few minutes.

"4. The occupant is always off the ground.

"5. The equal distribution in either case economizes space and gives each man a clear berth.

"6. The heads of the men are considerably raised above the draught from under the curtain of the tent.

"Three tents, each containing ten hammocks, have for some time been in use here by men of the Royal Horse Artillery, 10th Hussars, and 5th Fusiliers. Those of the last mentioned regiment have slept in the tent during all weathers, and have never suffered from damp or cold, indeed they have to myself personally expressed their sense of the comfort and snugness of the hammock, as compared even with the barrack room bed."

Dr. Mackenzie gave his opinion, after personal observation of the practical experiment, that Captain MccGwire's plan was practicable, simple, and likely to be most serviceable.

Should this field hammock be found under more varied and extensive test practically to have the advantages it appeared to possess, its utility might be great for troops on line of march in India, where it would save the expense of straw at every halt, or when encamping in that country during an invasion of cholera, when the men's bedsteads accompany them, and occasion a great expense for carriage during frequent changes of locality; whilst its use in standing camps, where boards and trestles are furnished, would economize space and greatly increase the comfort of the men.

The main feature, in the annual sanitary report of the Inspector-General and Principal Medical Officer of Ireland, is the inveteracy of venereal as a cause continually influencing the admissions to the military hospitals, the patent suggestion being that of extending the operation of the "Contagious Diseases Prevention Act" to the chief military stations of the country.

FOREIGN STATIONS OF THE ARMY.

CANADA.

Inspector-General Dr. Muir, C.B., in his review of the sanitary interests of the troops serving in Canada for the year 1864, has reported as follows:—

Accommodation.—The barracks, both permanent and temporary, the hospital buildings, guard-rooms, cells, &c., are in good order generally. No new works of importance have been constructed. London, Canada West, was discontinued as a military station in September. This might have caused some overcrowding but for the fact that the strength of the troops in this Command was reduced, in the autumn, to the extent of nearly 1,500 men.

During the year the troops have, in almost every instance, had the regulated number of cubic feet allowed to them; but in the few cases where it was unavoidably otherwise, the health of the men does not appear to have suffered in any way. In the warm weather there was always ample accommodation, as each corps sent out of barracks one or two companies for ball-practice, these men being placed under canvas.

Ventilation, Lighting, &c.—Every attention has been paid to the ventilation of buildings and rooms; and it may be said without hesitation that little remains to be carried out in this direction. The same may be stated as regards the efficiency of the mode of heating the barrack-rooms, hospitals, &c. It were to be wished that the method of lighting the barrack-rooms by night was equally satisfactory. There continues a great want of light generally, and this no doubt has a tendency to drive the men out of their barrack-rooms of an evening to seek more cheerful quarters, which at present, in many instances, prove to be low drinking-saloons. The military authorities hesitate to incur the great expense of lighting by means of coal-oil lamps, chiefly on account of

the uncertainty of the strength of the troops on this station. Coal-oil continues to be used in the military hospitals, and is universally approved of.

Baths; Lavatories, &c.—At all permanent stations there are a sufficient number of baths and lavatories, with a proper supply of water. At Montreal an excellent floating bath was furnished, in which the water was deep enough for swimming. This bath was much frequented by the men. In summer-time there have been bathing-parades once or twice a-week wherever there was a lake or river available.

Cooking, Provisions.—The means provided for cooking, both in the barracks and hospitals, are ample, and give great satisfaction. A varied diet can now be ensured, without which it is not to be expected that the health of the troops should be maintained at a high standard.

Beef has been issued five days out of the seven, and mutton on the two remaining days, at most stations, the quality nearly always excellent. The bread has been also of good quality, and furnished by contract everywhere except Montreal and Quebec, where it is made by the Commissariat Department.

The supply of vegetables has been abundant, very good, and tolerably cheap. The general physique of the men amply testifies as to the wholesomeness of the diet and the sufficiency of the quantity of both animal and vegetable food.

Married Soldiers.—Where there was not sufficient barrack-accommodation for married soldiers, buildings were hired for them, or they were granted the regulation lodging-allowance, provided they were married with leave. In barracks the families were provided with blankets and stores, and may be said to have been very comfortably housed.

Latrines, Urinals, &c.—Sewerage remains in a lamentable state throughout the Canadas. Some attention, however, is being paid to this important matter in Montreal. Latrines are, in most cases, mere cesspits, emptied by hand. They are frequently cleared out, and kept in as good a sanitary state as circumstances will allow. Ash-pits are also frequently emptied.

Hospital Diets.—The dieting of the sick, and the cooking arrangements, are everything that can be wished.

Clothing.—The clothing of the troops is adapted to the climate. In summer it would be an advantage if a lighter description of jacket were worn. It must be remembered that the thermometer for several months approaches 90° at noon.

Bedding.—This has been sufficient and of the usual description. The regulations have been carried out as to airing, &c.

Means of Recreation.—In every corps there is a recreation-room, where various games are provided, as are also books, periodicals, newspapers, &c. Tea and coffee can be obtained at reasonable prices. There are also soldiers' clubs at Kingston and Montreal, which are greatly patronised by the men. Gymnastic apparatus, skittle-alleys, fives-courts, &c., are provided at many of the stations, but there is room for more to be done in this direction. Money spent on these matters returns a good interest in the shape of increased health and energy on the part of the men, who are thus drawn away from the low haunts where intemperance and vice in every shape are to be met with.

Canteens.—Medical officers generally are unanimous in their opinion that a large amount of intemperance is attributable to the cheap rate at which very bad whiskey can be procured throughout these provinces. A man can get drunk, in fact, at many stations for a penny.

Under the excellent new regimental canteen system, good, wholesome, and cheap malt liquor is provided, and is able to compete to some extent with the vile whiskey sold outside the barracks, at all events as regards the young recruits. But, considering the poisonous nature of the cheap alcoholic drinks in this country, and their pos tively injurious effect upon health, it is open to argument whether it would not be advisable to keep a supply of wholesome and sound spirits in the canteens to meet the tastes of those men who will have their dram under any circumstances. A proper check could be kept on the issue.

It may be said this would amount to offering an inducement to young soldiers to learn the habit of dram-drinking, but this argument loses force when the fact remains that a man can get drunk for a little more than one penny, outside the barrack-gates, on a villainous, half-poisonous compound, capable of engendering sickness even when imbibed in small quantities. The new canteen system is certainly a great boon to the soldier, and is highly appreciated by

him. The supplies at present obtainable are of a far superior quality and cheaper than when the canteen was let to civilians, whose only interest was to make money as quickly as possible, with every temptation to defraud.

NOVA SCOTIA.

Mr. McIlree, Deputy Inspector-General, and Principal Medical Officer at Halifax, Nova Scotia, in his Annual Report for 1864, states that several improvements of importance in a sanitary point of view have taken place within the year, such as the application of the new system of ventilation in the Garrison Hospital at Halifax. Several material alterations and renovations have also taken place for the comfort of sick in this very old building.

He represents a considerable improvement to have taken place in the means of cooking the rations of the troops, as also in the accommodation for personal ablution at nearly all the barracks, &c., in the Command; and these, together with some minor alterations in drainage, ventilation, and in the construction of urinals, have constituted the principal changes of importance.

New dead-houses have been erected at St. John and Fredericton, New Brunswick; and a guard-room has been fitted up as a hospital at St. John's, Newfoundland.

The principal improvements in barrack and hospital accommodation, &c., still indicated are as follows:—

1. New system of ventilation, to be applied to all military buildings where practicable.
2. Guard-room accommodation generally too confined for health, particularly at Halifax, Nova Scotia, and St. John, New Brunswick.
3. Increased means for personal ablution required at all hospitals in the Command, also in Glacis Barracks, Halifax.
4. Dead-house at Garrison Hospital, Halifax, Nova Scotia.
5. Increased hospital accommodation at St. John and Fredericton, New Brunswick.
6. The addition of a quarter for a resident Medical Officer at Garrison Hospital, Halifax.
7. Hospital for treatment of sick women and children.
8. Increased accommodation for families of married soldiers all over the Command.

Increased amusement for men is specially recommended by Medical Officers as the best means for weaning the soldier from the grosser indulgences, the advance in this respect during the past few years having a very beneficial tendency, though the means at command (now nearly altogether from private resources) are very insufficient for the purposes desired.

JAMAICA.

[Extract from the Annual Sanitary Report for 1864, by Deputy Inspector-General Bent].

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As a general rule, there has been but little connection between the diseases from which the troops have suffered during the past year and local influences. A few instances are, however, specified in the sanitary reports of Medical Officers in charge, in which the health of the men has been probably affected by causes of mischief more or less preventible, and these are as follow:

At Up-Park Camp, which is, except on emergencies, wholly occupied by black troops, the latrines are reported as very offensive at night, and some synchronism has been observed to prevail between the period of emptying them and an accession of typhoid fever. These latrines are built over large cesspools, and are placed in the rear of the barracks at about 50 yards distance. They are therefore to leeward during the day, when the sea-breeze blows, and to windward at night, when there is usually a steady land-breeze. During the latter hours there can be no doubt that the effluvium is carried back into the

occupied buildings, and is often oppressive and sickening. Several measures have been taken to remedy the evil, but as they only consisted in alterations of the shoot into the pit and in improved ventilation, there has been but little good effected. According to my view, the only radical cure will be the substitution of latrines, with moveable boxes, like those in use in the large camps at home, where the deposit is removed bodily every night. And I therefore recommend, in the service for the current year, that the cesspools shall be filled up, and the construction altered upon the principle alluded to. Drainage into the sea, flushed with running water, though an obvious alternative, seems to be out of the question from the distance (nearly two miles) and the magnitude of the operations it would involve.

Objection is also taken by the reporting Medical Officer to the Zouave dress of the men, in which he is supported by the Staff-Surgeon in charge at Port Royal, as being too hot and heavy about the body, and leading to injurious chills when thrown off. This is not without reason; but I am not prepared, without stronger evidence of its cogency, to recommend any change in the uniform at present.

At Port Royal, Staff-Surgeon Skeen reports that remittent fever is aggravated and probably induced by the filthy state of the town, the regurgitation of ordure on the sea-beach near the barracks, the overcrowded guard-room, and the wetness of the parade in rainy weather. With regard to the first two of these objections, there is no question but that the town of Port Royal is foul and noisome, from the impossibility of drainage, and the total want of municipal action in the matter of purification; and also that the reflux of the water, under the influence of the land-breeze, does throw up garbage and floating excrement from the naval anchorage along the western shore, and, to a certain extent, I think it likely injury to health has resulted. But the ratio of sickness since I have been on the station has been so low at Port Royal that it is clear the mischief is not formidable, and a very simple barrier (of shot or short stakes) which has been suggested, will prove effective against the beach nuisance. The inadequacy of the guard-room has been constantly pointed out; but although the average cubical space per man is below 200 feet, the building is so freely pervaded by the breeze, day and night, through open jalousies, that, practically, the men are living in the open air. Still it is not desirable so many men should be so close together, and some extension of the area should, in my opinion, be, if possible, obtained. The wetness of the parade, also referred to, is, I imagine, unavoidable during heavy rains. The level being perfectly dead, and a few inches only above the sea, it is impossible the water can run off, and there it must remain until absorbed by the shingle or dried by the sun. Fortunately, with such a soil and such a sun, the process is not long.

The structural changes that have been carried out during the year have been, at—

Up Park Camp.—Roof-ventilation in canteen and kitchen, in General Hospital, and in Soldiers Barracks, B.

Port Royal.—Roof-ventilation in Commissariat and Quartermaster's Stores.

Newcastle.—Roof-ventilation in soldiers' barracks D, E, F, G, and providing accommodation for eight married soldiers' families.

At the latter station also, excellent kitchens, fully equipped with stoves, &c., have been completed, and well-appointed ablution-rooms. A plunge-bath, however, is still much needed, and this will be provided in the ensuing year.

CAPE OF GOOD HOPE COMMAND.

[Extract from the Annual Report for 1864, by Deputy Inspector-General Lawson].

Water.—The water is obtained from the same sources as last year, and the quality remains unchanged. In December I found at King William's Town that the water from the aqueduct which passes close to the barracks, and which contained a very large quantity of vegetable, and, apparently, other forms of organic matter, was commonly used, both for cooking and drinking by the men,

though no diseases seemed to have been caused thereby. As it was of great importance, however, to remove such an obvious possible source of disease, I recommended that water direct from the river only should be used for cooking and drinking; and arrangements have since been made for affording a regular and sufficient supply for these purposes.

During the year the rain had been unusually scanty. At Cape Town, where the average fall annually is about 25 inches, there were 19 only, and the same deficiency has been experienced in the eastern province and Kaffraria. Where small stations are close to streams, water for the ordinary domestic purposes has been abundant; but where, as at Port Elizabeth and Graham's Town, there is a large population with a more limited source of supply, some anxiety was experienced.

Buildings.—These have, with few exceptions, remained the same as last year. At King William's Town several barracks have been erected on the pavilion system. These are of brick, with raised basements, and single floors with free ventilation under them, covered verandahs on the north side and at the ends, with free roof-ventilation and apertures in the side-walls, near the ceiling, for the admission of fresh air. These rooms are calculated for 20 men, and, with this number, afford each 662 cubic feet. It is intended to increase the number of these buildings, and gradually to get rid of the wattle-and-daub huts altogether at this station.

There has been little or nothing done during the year to improve the ventilation. At Cape Town, wooden shafts were put up, extending from the ceilings of two rooms through the roof. These have a revolving metal cowl at the top, which, by permitting the opening to be always to leeward, keeps out dust and rain, while the ventilation is unimpeded. Inlets through the side-walls have also been opened. These rooms were provided with the ventilating-shafts, to ascertain how the system would work. As the condition of the internal air was greatly improved by them, it has since been proposed to extend the system to all the rooms in the barrack.

The hospital at Cape Town consists of two pavilions, with houses for the officers between. Each pavilion has two floors, and on each two wards, with a partition between them, and windows on one side only. Each ward has two fire-places, one at each end. One of these was fitted with the Anglo-American stove recommended by the Commissioners on Barracks, with the necessary arrangements for heating air, and the other built up, but an opening broken into its chimney just under the ceiling, so as to make it an extracting shaft. Care having been taken to arrange the size of the inlets properly, it was found that the whole acted well without down-currents, though the draught of the chimney, unless the opening of the flue were much reduced, was far too great. It was easy to diminish this, however, by placing a brick in it, which could be removed, when necessary, to clear it from soot. When the area of the flue was sufficiently reduced, one fire was found to keep the ward at a comfortable temperature on the coldest days at Cape Town, though the ventilation was proceeding vigorously. This system will be extended to all the wards at Cape Town.

One of the wooden huts originally intended for the Sanatorium at Wynberg is being erected at Maritzburg for an hospital. The site selected overlooks the town, and is freely exposed to the sea-breeze, while the buildings of the Fort, a little distance behind, shelter it from the force of the hot land winds.

The space in barracks has continued with little change, not exceeding 240 cubic feet per man in some of the smaller frontier posts, but generally from 450 to 600 cubic feet, and at Cape Town about 800. In June, the detachment at East London, which until then was in tents, was reduced so that the barrack there was sufficient for their accommodation.

In the hospitals there has never been less than 500 cubic feet per man,—generally a good deal more,—and where marquees have been employed, the number of patients has almost always been limited to eight.

Warming and Lighting.—These continue as last year.

Baths and Lavatories.—There has been no change of importance in these during the year. Most of the frontier stations being near streams, bathing places have been improvised, and during the warm weather the men use them freely; but there is little lavatory accommodation except at Cape Town, Graham's Town, and King William's Town, and that too limited, and with indifferent arrangements as to water-supply. At the outposts, where every-

thing is of a temporary nature, the completeness of details to be expected in connection with more permanent buildings can scarcely be looked for, but even the latter are sadly deficient at present, though exertions are about to be made to remedy this state of things to some extent.

Kitchens.—These continue much as last year. The cooking is mostly done in fixed boilers; at some of the smaller stations, in camp-kettles. There are limited means for baking at Cape Town, King William's Town, and Fort Beaufort, Windoogelberg, and Maritzburg; but the men prefer, in many cases, to boil their rations, though these are at their disposal.

Married Soldiers.—These are kept as much as possible in single rooms when they are available, and when not, two or more families in a room, but not mixed up with single men when it can be avoided. There are very few families, so far as I have seen, who are not accommodated separately from the unmarried men.

Latrines, &c.—These continue unaltered. Buckets are in use everywhere except Maritzburg, and, considering the frequent scarcity of water and the want of proper outlets for sewage were water available, except at Cape Town, no other method seems applicable. The buckets require constant attention, and are often much in want of scrubbing; but wherever proper supervision is exercised, the system works pretty satisfactorily. At Maritzburg the large cesspits previously noticed continue in use, but measures have been taken to have them emptied, filled up, and buckets substituted.

The latrines throughout the Command are, for the most part, deficient in ventilation. Free openings at the ridge have been recommended in all where this is required.

Rations.—The ration, with extra ration of groceries, embraces the following daily:—Meat (fresh), 1 lb; bread (soft), 1¼ lb.; coffee, ⅓ oz.; tea, ⅛ oz.; sugar, 2 oz.; salt, ½ oz.; pepper, $\frac{3}{80}$ oz.

Salt meat and biscuit are occasionally issued once a week in place of fresh meat and soft bread, in the proportions of 1 lb. of the former and ¾ lb. of biscuits for 1 lb. fresh meat and 1 lb. soft bread. The meat by contract, should be beef five days a-week, and mutton two days; but at the smaller stations in the warm weather, as the consumption is so limited, mutton is used almost exclusively.

The supply of vegetables has been tolerably fair during the year. Gardens have been cultivated at most of the frontier posts; but owing to the natives or German settlers producing considerable quantities of these now, and the frequent change of detachments, which seldom remain out more than three months at once, they are not so systematically cultivated in all cases as they might be. At some of the posts considerable attention has been given to the gardens, though the natives in the neighbourhood bring quantities of vegetables for sale.

During the year only one case of scorbutus (remaining from 1863) was under treatment, and two cases denominated purpura were admitted.

Canteens.—Most of the corps have had canteens, with the apparatus for games and reading-rooms attached. These are generally pretty well frequented, and serve to occupy a portion of the men's leisure harmlessly, which but for them, might be passed in less reputable places and in more questionable pursuits. The canteens under regimental supervision have undoubtedly had a beneficial influence on the men, though not in all cases to the extent it might have been desired.

Clothing.—The usual clothing employed in England is worn here during the cool season; during the warm, linen or cotton patrol jackets and serge trowsers are worn, with white cap-covers. The Cape Mounted Rifles had during the summer a loose green serge patrol-jacket, which seems well adapted to the season, but their trowsers were then of the stout texture they wear in winter. The employment of shirts of flannel, or, rather, a mixed fabric of wool and cotton, has been pretty common in place of calico or linen. If due attention be given to washing them and making the requisite changes, especially during the warm weather, they will be found useful in most cases, and more conducive to health than unmixed cotton or linen.

Bedding.—This is of the usual description, and remains as last year. When men have been under canvas they have always had boards and trestles or bedsteads, unless when on the line of march.

Duties.—These consist of the usual parades and guards, with ordinary fatigues. There have been no marches unless on change of station or escort

duty, which have always been moderate. Parties have occasionally been employed in repairing roads in Kaffraria. The duties have usually permitted the men to have from three to five nights in bed,—seldom so few as two, and then owing to exceptional circumstances of limited duration. No representation has been made that the health has suffered from the duties; and the parties employed in road-making have always been remarkably well.

Intemperance and Crime.—The amount of intemperance would seem to have been little different from previous years, and to have received no special examination from any of the Medical Officers. Unless submitted to such investigation the conclusions arrived at by individuals but too often serve to mislead.

The means in use for the repression of intemperance are those commonly employed in the service, together with the establishment of canteens and reading-rooms, where beer, wine, and coffee can be procured, and where interesting occupations are added, such as newspapers, periodicals, and games for those who have a disposition for them. These are all useful and serve to diminish the amount of drunkenness, but still it prevails to a considerable extent.

MAURITIUS.

The Sanitary Report of Dr. Archibald Gordon, C.B., Deputy Inspector-General, is to the following purport:—

The barrack accommodation generally afforded a cubic space of, viz., Port Louis, Line Barracks, 530 feet; Royal Artillery Barracks, 725; Citadel, 585; Mahebourg, 555; Flacq, 568; Grand River, S.E., 561; Cannonier Point, 929; Black River, 666; which, although not according to the recent appropriation and recommendation of the Barrack Commissioners, nevertheless, considering the nature of the climate and the thorough ventilation by means of doors and windows opening on each side, generally, of the barrack-rooms, may be considered, under the circumstances, fair. At all events, disease has not been positively caused or aggravated from deficiency of cubic space or from imperfect ventilation.

The ablution rooms, baths, cells, guard-rooms, ashpits, &c., were kept in perfect order, the latter being cleaned out daily, and the latrines, all on Garbert's deodorizing principle by peat-charcoal, had their contents daily removed.

Throughout the Command, with the exception of the small outposts of Cannonier Point and Black River, Deane's cooking boilers and stoves are now in general use, and have been found to answer admirably well, leaving nothing to be desired on this head.

The Garrison Hospital, with its bath, ablution-rooms, &c., afforded satisfactory accommodation for all the requirements of the year, and exception could only be taken to its unfavourable and confined site.

The different hospitals of the Command afforded a cubic space as follows:—that of Port Louis, 1,176 to 2,187 feet; of Mahebourg, 1,600; of Flacq, 954 to 2,862; of Cannonier Point, 4,058; all of which were found sufficiently adequate for the extent and nature of the requirements.

The rations and diets underwent no change, and, from the reports of the Medical Officers generally, would appear to have been good. The supply of vegetables was tolerably abundant to suit the health of the troops.

The canteen supplies were excellent.

The duties and employment in no way proved prejudicial to the men.

The internal economy of the different regiments would appear to have been highly satisfactory. At all events disease cannot be said to have resulted from any short-comings on that head.

The clothing in general use is now admirably adapted for the climate. Wicker helmets were issued to several of the troops; and it is to be hoped that this well-suited head-dress will be universally worn by them next hot season.

CEYLON.

The Principal Medical Officer, Deputy Inspector-General Fraser, C.B., reports:—

"The year has been very unhealthy, the total deaths among European

FORT
LAKE
LAKE
GALLEFACE
PARADE GROUND
RIFLE BARRACKS
MESS
OFFICERS Qrs
PETTAH
SLAVE ISLAND
CINNAMON GARDENS
WELLS
REARS
A MAP
of the
RIFLE LINES
SHOWING THE POSITIONS OF THE
WELLS.
Henry A. Martin M.D.
STAFF ASSIST. SURGEON

troops having been at the rate of 33·7 per 1,000, and among the native troops, 32·4 per 1,000 of mean strength, approaching the mortality of the former, and owing chiefly to epidemic cholera in Slave Island, Colombo.

"In my annual report, the per centage of sick and mortality for each station is given; and there can be but one opinion that the large amount of both might be very much reduced by improved barrack construction, external and internal ventilation, lighting, drainage, a better supply of good water, better cooking arrangements, improved ablution convenience, and good vegetables; potatoes and onions to form part of the ration. Colombo is pre-eminently defective in all those particulars, and suffers in proportion. During the year, the average number of nights in bed has been three and four; and, to prevent progressive deterioration of health, the duties should be reduced, or the force increased, to allow six nights in bed, in a climate so relaxing and wearing.

"No sanitary improvements have been effected during the year in respect of cubic accommodation or ventilation of barracks and hospitals in the Command.

"The ablution difficulties remain unchanged. Cooking continues in primitive native fashion. Baking is seldom resorted to, even when ovens are available; and Duff's (like Grant's) experimental cooking range has been abandoned in Colombo from the expense of fuel.

"No alteration has taken place in the soldier's (ration) diet, which wants an allowance of vegetables.

"The clothing of the troops is suitable to the climate, especially since the addition of the serge patrol jackets.

"The drainage—or, rather, the entire want of it, especially at Colombo—continues as unchanged as it was 100 years ago under the Dutch rule.

"No alteration has taken place in the seething, stagnant canal near the barracks, nor in the swamps and paludial impurities in the immediate vicinity of the Fort of Colombo.

"The vicinity of all the stations is also, more or less, in the same unsatisfactory, unchanged condition."

It is understood that a commission is to be appointed to inquire into the military expenditure and establishments of Ceylon, including the distribution of the troops and the military buildings.

Doubtless the report of the Commission will be exhaustive, and, as the evidence of all competent to give it will be obtained, the sanitary requirements of the Command will be made evident. As it is well understood that, with few exceptions, the barracks are unsuited in nearly all respects for the location of troops, it is expected that the recommendations of the Commission will involve a radical change in the construction of the buildings; and, in many instances most likely more desirable localities will be obtained for the erection of new barracks. In anticipation of the report of the Commission, it is not considered necessary to enter into a detail of the defective condition of the barracks at Ceylon (frequently before adverted to) in the remarks upon that station this year.

The following reports upon the bad quality of the water used by a portion of the troops in the Command, are of material value, and well illustrate the advantages derivable by Medical Officers from the preliminary training at Netley, which enables them so fully to investigate so important an element of health as the water-supply.

A Report on the Wells, which are made use of by the Native Troops on this Station, with a Chemical Analysis of the Water obtained from each. By Staff Assistant-Surgeon A. MARTIN, M.D.

Colombo, December 13, 1864.

No. 1.—In the Hospital Compound. Situated 25 feet from the lake, and 30 feet from the common rear in use by the patients. Well is 12 feet deep, with 3½ feet of water, uncovered, sides lined with lichen and other vegetable growths, and a thick scum of green organic matter present on the surface of the water. This well has not been in use for some time in consequence of its foul condition.

No. 2.—Behind the Gun Lascar's Barracks. Situated 8 feet from the lake, 9 feet deep, and 3½ feet of water; semi-covered; in tolerably clean condition; water puddled, with a brackish saline taste. In use for drinking and cooking purposes.

No. 3.—In front of Lascar Barracks. About 40 feet from the Slave Island Road, and 50 feet from the lake; 12 feet deep, with 5½ feet of water; uncovered; in dirty condition; water puddled, with brackish taste. Not much used for drinking purposes.

No. 4.—Behind Lascar Serjeants' Quarters. 60 feet from lake; 10 feet deep; 4 feet of water; covered. Water foul and brackish; used for drinking and cooking purposes. [The common rears are situated at about the distance of from 40 to 50 feet from the three last wells (Nos. 2, 3, and 4)].

No. 5. In compound of the married quarters of Rifles in Kew Gardens. Situated 20 feet from the lake; covered. The water from this well is so bad that the married people only use it for cooking and washing purposes. For their drinking supply they have to fetch from a well in the Cinnamon Gardens,—a distance of some 250 yards.

No. 6.—Near Cinnamon Gardens, in native village. 15 feet deep; 6 feet of water; uncovered; 100 yards from the lake. This well is in a very dirty condition, and all the ground in close proximity is strewed with all kinds of filthy debris. The water is good as regards taste, and is clear and sparkling. This is, no doubt, in consequence of the constant demand there is on it.

No. 7.—Behind the Rifle Lines. 15 feet deep; 5 feet of water. Is only 10 feet from a large rear. Is in a filthy condition, the water being half stinking. Only used for drinking purposes.

No. 8.—On the Parade Ground. Situated at the north-eastern extremity, at a distance of 20 feet from the lake. Well is 12 feet deep, with 6 feet of water, uncovered, and in a dirty condition; sides covered with lichens and other vegetable growths. Water is transparent, and of good taste. This well is more used than any other in the lines, as the water from it is the best in quality, and, in fact, is the only one, with the exception of No. 6, from which the water obtained is palatable.

General Analysis.

Total solid matter per gallon. Grains.		Grains.	Total solid matter per gallon. Grains.		Grains.
No. 1.—36	Organic ..	12	No. 5.—88	Organic ..	8
	Inorganic ..	24		Inorganic ..	80
	Total ..	36		Total ..	88
No. 2.—38	Organic ..	6	No. 6.—22	Organic ..	6
	Inorganic ..	32		Inorganic ..	16
	Total ..	38		Total ..	22
No. 3.—23	Organic ..	6	No. 7.—176	Organic ..	32
	Inorganic ..	17		Inorganic ..	144
	Total ..	23		Total ..	176
No. 4.—24	Organic ..	18	No. 8.—12	Organic ..	4
	Inorganic ..	6		Inorganic ..	8
	Total ..	24		Total ..	12

[No. 9.—This well was omitted by oversight. It is situated in the compound of the Staff-Serjeants' quarters. It has on either side of it (at a distance of about 30 feet) the common urinals and privies made use of by the serjeants and their families. The water from this well is never used for any other than bathing and washing purposes.]

The inorganic matter is made up of the salts of lime, magnesia, and soda, combined in their various relative proportions with carbonic, sulphuric, and nitric acids, and chlorine, in the form of carbonates of lime, magnesia, and soda, and nitrates and sulphates of the same bases. Carbonate of lime and chloride of sodium are present in considerable quantities in all eight samples, and in Nos. 5 and 7 these salts greatly preponderate.

In No. 7, nitrates are found in rather large proportions; and, under the microscope, very perfect prismatic crystals of nitrate of lime are seen. Sulphates are also present in small quantities in all the specimens.

In testing for organic matter (qualitatively) by means of the reagents permanganate of potash and chloride of gold, very satisfactory results were obtained, for the reactions in each sample corresponded approximatively to the amounts actually procured by evaporation and calcination of the solid product.

The large amount of organic matter present in all these wells is not to be wondered at when the following facts stare one in the face.

The almost direct source whence most of the wells are supplied is the lake, and, as will be seen in the accompanying map, Nos. 1, 2, 3, 4, 5, and 8 are situated within only a few feet of it, the water simply percolating through the intermediate soil, which is of a light sandy nature. This is shown by the water in the wells and in the lake being precisely of the same level. This lake is nothing more nor less than an enormous cesspool, the receptacle of every possible kind of filthy matter that can be conceived. On almost every side, with the exception of the portion occupied by the Rifle and Gun Lascar lines, are the native pettahs and villages, with their swarming populations existing totally regardless, and, in fact, with habits diametrically opposed to all hygienic principles. Its banks are resorted to by thousands of natives who, after bathing, commit the most disgusting nuisances close to the water's edge. Horses and bullocks are daily taken to be bathed in it, and all the dhobeys make use of it for washing their clothes. Moreover, in close proximity to four of these wells are the common latrines made use of by all the native troops and their families. These latrines or rears are formed by wooden platforms erected just at the edge of the lake, the excreta simply dropping on its banks. [During the months of April and May, the lake is frequently almost entirely dried up, leaving its bed exposed to be acted upon by the sun which is at this time just passing over the island. The consequence of which is that the most horrible stenches arise from the disengagement of various noxious gases generated filling the surrounding atmosphere with their effluvia]. Or, where this mode cannot be adopted, pits of about from 10 to 12 feet deep are dug in the ground and floored over, in which the fœculent matter collects, and is allowed to accumulate until these pits become inconveniently full, when, on application being made, they are emptied. This occurs, on an average, between every two and three years.

This state of things having gone on for many years, with immense numbers daily making use of these rears, as a natural result the ground in the vicinities for many yards must be completely saturated with the fluid portions of the excrement in a decomposed condition, and especially when the sandy soil is borne in mind, and when the sides and bottoms of these are unlined.

The amount of organic matter present in the best of these wells is by far more than can be admissible in even indifferent drinking-water. Means ought at once to be taken to remedy this great source of evil, for the consumption of it cannot go on without causing the most baneful effects, and producing very serious detriment to the health of the troops.

It is advisable that the whole of these wells be abandoned, and fresh ones made; but, if this is not practicable, the best of these should be selected and thoroughly cleansed and rebuilt, and means taken to protect them from foreign impurities. And even then, before it should be used for drinking purposes, it should be filtered through cleansed sand and charcoal.

General Report upon the Wells within the Fort of Colombo, accompanying the Analysis of the Water contained in them. By Staff Assistant-Surgeon A. Martin, M.D.

Geographical Position of the Fort.—The Fort of Colombo is situated on a rocky promontory jutting out into the Indian Ocean, surrounded almost entirely by water, it being bounded on the W., NW., N. and N.E. by the sea, and on the S.SE. and S. by a deep canal running across inside, a ditch outside, and beyond by an artificial lake, supplied partly by the River Kalany, but chiefly by rainfall.

Geological Formation.—The geological formation of the fort is entirely of the primary order, and is of a very singular and interesting nature.

The basis is composed of a very hard and close-grained variety of gneiss, containing a large amount of iron, not very equally distributed, and stratified by veins of quartz and granite in some localities.

As a result of the decomposition of this gneiss, a very curious sort of conglomerate mass has been formed, to which the term "laterite," or "cabook" has been given the latter being the name by which it is most familiarly known in Ceylon. In composition it contains all the essential matter of which gneiss is made up, viz., quartz, felspar, and mica; but, from some influence—probably chemical action—the felspar, instead of retaining its hardened, crystalline form, has changed into a soft, curdy substance, easily broken down when rubbed between the fingers, the quartz and mica remaining in an unaltered state.

On subjecting a portion of this cabook to the action of water, the whole of the decomposed felspar may be separated by elutriation, and, by drying, a fine argillaceous clay, resembling very closely, when freed from iron, the "kaolin," or porcelain clay of Cornwall and Devonshire. But, from the presence of peroxide of iron according to the amount contained, it becomes stained from a light cream colour (yellow ochre) to a dark brick-red (red ochre).

Running across the middle of the fort from east to west, there appears to be a ridge or backbone of gneiss rising to the surface, and on either side are beds of cabook filling up the spaces, having been worn away from the top, most probablyby the action of rain and other mechanical means. It is found usually a very short distance below the surface, and varies in depth, in different parts from a few feet to over 30 feet. It possesses some very peculiar properties, such as a surprising power of absorbing and retaining water, more than half its weight being driven off by heat. When dug from a few feet below the surface, it is found in a soft, cheesy consistence, easily cut or moulded into any shape, but, on exposure to the sun and air, it soon becomes a hard and more or less porous concrete.

As one comes down upon the bed of gneiss, the cabook becomes much harder, and, in some instances, it is very difficult to draw a definite line between them, showing that the transformation appears to be still going on. This may be seen very clearly in some quarries in the neighbourhood of the fort.

With the exception of two out of the wells I have examined, they all appear to have been dug out of the cabook.

Source of Water.—As regards the source of the water, there are two facts present which would, at first sight, lead one to the supposition that it found its way from the sea. Firstly, I have ascertained, by comparing the relative situations of the several wells and the sea, in section plans belonging to the Royal Engineer Department, that the surface of the water in the wells west of the canal and the sea-level are, as nearly as possible, on the same plane.

Secondly, the water in each well contains the same salts as are found in the sea, and in about similar proportions. Moreover, in all the wells which I have descended, there are numerous fissures and veins, through which it is possible it might have access.

On, however, taking the average rainfall in Colombo during the last ten years, I find that it amounts to 76½ inches per annum. This alone would be sufficient to keep up the supply, I presume, in all the wells.

With regard to wells Nos. 2, 3, and 4, situated on the slip of land between the canal and ditch, and No. 5, on the Laboratory, which is almost an island in the ditch, the water is precisely on the same level with that in the ditch, showing that these wells either derive their supply from it, or that they have all one common source, for during the dry seasons, when the water in the canal and ditch falls, a similar occurrence takes place in these wells.

The presence of the sea-salts in all the water is satisfactorily accounted for in other than direct means; for, during the prevalence of the south-west monsoon and sea-breezes, a very large amount of saline matter is blown in and deposited on the surface of the fort, which, during the heavy falls of rain, would be re-dissolved, and permeate into the wells.

Supply.—I should think that, if any of the wells be deepened, an almost unlimited supply of water is obtainable.

Impurities.—The impurities found to be present in common throughout all these wells, as stated before, are those derivable from the sea, viz., chlorides of sodium, calcium, and magnesium, and sulphates of magnesia, lime, and soda.

Iron also is found to the extent of about 2 grains per gallon in each case on an average derived from the cabook soil. Organic matter is present in a rather large proportion in Nos. 2, 3, 4, 5, 6, 7, and 10, on an average about 2 grains

PLAN
of the
FORT OF COLOMBO,
WITH ESPECIAL REFERENCE TO THE
WELLS.
SCALE
REFERENCE
Ordnance Building colored
Military do do
Government do not Military
WELLS
DRAINS
INNER
HARBOUR
BATTERBURG
AMSTERDAM
CHURCH STREET
GRAND
PARADE
PRINCE STREET
HALLE BUCK
CHATHAM
STREET
HOSPITAL
HOSPITAL
SQUARE
MIDDLEBURG
ROTTERDAM
DITCH
UPPER
DITCH
LOWER
DITCH
LOWER
DITCH
LAKE
LAKE
LAKE

per gallon,—most probably owing its origin to bad drainage, &c., and surface filth

Nitrates, which may be inferred to be the result of decomposed organic matter containing ammonia, are present in such quantities as to render such water highly prejudicial and unsafe for use. I regret that I am unable, from want of necessary apparatus, to say how much is actually contained; but, from the qualitative analysis I have made, judging from the reaction given by the tests approximately, I should say that, with the exception of Nos. 7, 8, 11, 12, and 14, from 1 to 4 grains per gallon are present. These compounds are the most deleterious of any impurities usually found in water; and, if present in more than 2 grains to the gallon, the water should not be used for drinking purposes unless previously filtered.

Traces only of carbonic acid are to be found, and to this fact is due the absence in all the waters of these wells, of that fresh taste and sparkling limpidity so characteristic of good spring water.

General Summary.—In drawing up a general conclusion as to the general quality of the water in the fort wells, whilst I do not consider the best thoroughly good drinking-water, I at the same time cannot say whether or not any diseases may be primarily attributed to drinking the water from any of these wells, even from the worst of them, as there is no satisfactory evidence to show that such is the case. But in subjects in whom there is any tendency or predisposition to bowel and tuberculous diseases, such as cholera, dysentery, diarrhœa, phthisis, &c,. I have no hesitation in stating it as my belief that, if drank in immoderate quantities, which will be generally found to be the case (as an insatiable thirst usually is a premonitory and accompanying symptom in these diseases) it considerably contributes to aggravate them; and, moreover, conjointly with climatic influences and bad food, I think it very likely that the use of these waters would play an active part as a predisposing cause for the origination of these diseases.

As a precautionary measure, I would most strongly recommend that all the water consumed for drinking purposes be first thoroughly filtered.

Since the adoption of this plan with the water in the Ceylon Rifle wells, there has been a great decrease in sickness amongst the troops; but whether attributable to this cause I cannot state with certainty, as sufficient time has not elapsed since the system has been working to come to any decisive conclusion.

The wells are, without exception, all in a very dirty condition. Means should be taken to ensure such as are in general use being cleaned periodically at intervals of not less than six months, for there is no doubt that many sources of contamination may thus be prevented.

With regard to the supply of the garrison, means, on a much more extensive and efficient plan will have to be adopted to that now in use in the Ceylon Rifle lines. I would propose that, instead of raising the water by hand, steam-power be called into service, or otherwise bullocks. If the former be erected, I see no reason why, supposing that one of the best wells be selected (due regard being paid to the site, &c.), in addition to the required amount to be filtered for drinking purposes, a sufficient quantity might not be raised to establish a complete supply to furnish not only the barracks, but also the officers' quarters, for domestic and all other purposes. If this plan could be accomplished, there can be no doubt that, as a sanitary measure, it would conduce greatly to the health, cleanliness, and general comfort of the troops. The best wells are decidedly those on the south side of the fort, Nos. 7, 8, 9, and 10. If only kept clean and in good order, and sufficiently drained, the water, after filtration, would be of a very fair quality.

The reason that a great many of these wells contain such impure water is that there is not a sufficient amount drawn to prevent stagnation taking place. Animal and vegetable matter soon become generated, and the wells, getting a "bad name," are no longer used.

The greater the drain on a well, the more pure and less contaminated the water is likely to be; and if it be ascertained that a sufficient permanent supply is obtainable to carry out this suggestion, I would recommend that the whole consumption should be drawn from one well.

Analysis of the Water from the Principal Wells within the Fort of Colombo,

No. of Well.	Situation, General Description, &c.	Physical Examination.	Microscopical Examination.	Chemical Analysis.*							Total Solids.	General Remarks.
				Quantitative.				Qualitative.				
				Organic Matter.	Earthy Salts.	Chlorides.	Iron.	Sulphates.	Nitrates.	Carbonates.		
				Grs.	Grs.	Grs.	Grs.	Grs.	Grs.		Grs.	
1	Behind and between No. 12A Barracks and Garrison Church. Depth 13 feet; depth of water, 4 feet. Built round with masonry for upper 8 feet; cabook below. Covered with raised platform. Pump, supplying ablution-room (close by)	Clear, and tolerably agreeable, but somewhat flat and insipid	Vegetable debris in sediment	0·79	14·77	25·6	2·9	About 4 or 5	Present in rather large quantity	A trace only	55	This water is said to be very good, and is used by company occupying No. 12 Barracks and by the majority of the married in new quarters
2	Between the Main Guard Room and Ablution Room. Depth, 15 feet; depth of water, 4½ feet. Built round with brick for upper few feet, cabook below. Covered with raised platform, and force-pump to supply adjoining ablution-room	Puddled: of a flat, insipid, and slightly brackish taste. A large quantity of suspended matter	Suspended matter almost entirely vegetable debris. A few large animalcula:	3·14	11·63	11·9	0·68	From 4 to 5	Ditto	Ditto	37	Considered indifferent, but still used largely by Nos. 7 and 33 Barracks, and guard-room and cells. Well in a very dirty state
3	In the middle of Parade Ground. 13 feet deep; 1½ foot of water. Built round, but uncovered	Puddled, and similar in taste, &c., to No. 2	Similar to No. 2	2·8	9·44	10·5	1·4	Ditto	Ditto	Ditto	33	Considered very indifferent, and only used for cooking purposes. Well very dirty
4	Behind Serjeants' Mess. 25 feet deep, and 5 feet of water. Uncovered; upper part built with brick. One half of the bottom blocked up with a large boulder of gneiss. Is only 50 feet from the canal on the one side, and about the same distance from ditch on the other	Clear, and tolerably pleasant to the taste, but is rather flat	Nothing worthy of note found	1·6	9·1	12·24	1·9	A trace only	3 to 4	Ditto	28	Said to be one of the best wells in the Fort. Largely consumed by private families. Well in a very dirty state, with copious vegetable growths of lichens and lycopods on its sides
5	Laboratory well, outside the Sally-port Gate. Situated almost upon an island in the Fort ditch. Depth 16 feet, and 5 feet of water; uncovered, and of small size; built round with brick	Tolerably clear, and very agreeable to the taste, although somewhat flat	Plenty of vegetable debris in sediment	2·18	20·6	12·5	1·9	Ditto	Ditto	Rather more than the above	42	The water from this well has been (until lately) very much esteemed, the majority of married officers being supplied from it. It is in a very dirty condition

6	In the Hospital Compound. 18 feet deep; 6 feet of water. Built round with masonry; of large size, and covered by a raised platform, with pump adjusted to supply the wants of the hospital	Clear, and tolerably palatable. Is rather flat, and a faintly saltish taste is noticeable	Nil	1·24	...	20·5	2	About 6 or 8	1 to 2	A trace only	41	Said to be very fair drinking-water. Consumption very considerable
7	Outside Hospital Gate. 19½ feet deep; 2 feet of water. Built round with brick, and covered with raised platform	Cloudy; disagreeable taste; very brackish	Animalculæ of various kinds, and vegetable debris	2·69	7·3	30·0	2	Ditto	None	Ditto	54	Considered to be bad. Scarcely ever drawn from. In a filthy state
8	In the Military Store Yard. 23 feet deep; 3½ feet of water; of small size; semicircular in shape; built round by masonry; covered by a shed; cabook bottom	Clear; pleasant and agreeable taste	A few large animalculæ	0·37	8·0	19·2	2	Ditto	Ditto	Much larger amount than in any other	36	Water considered to be exceedingly good; but, from the well not being accessible to the public, it is little used, and its presence is known but to few
9	Outside the Quarters of Officer Commanding Royal Engineers. 26 feet deep; 5 feet of water; partially covered, and built, for upper 9 feet, with masonry; cabook sides and bottom; of large dimension. Close to a rear in Royal Artillery yard	Clear; not very agreeable, a saltish taste being perceptible	Ditto	0·89	8·5	25·1	2	Present in a very small quantity	Present from 1 to 2	Small amount	42	Water considered to be tolerably good; largely used by the Royal Artillery and for Officers' Quarters. Well is in a dirty condition
10	Between Officers' Quarters and the Royal Artillery Barracks. 30 feet deep; 13½ feet of water. Covered with a raised platform; sides built for upper 8 feet	Tolerably clear; disagreeable saline taste	Ditto	2·73	9·45	26·9	2	Ditto	Ditto	Scarcely traceable	48	Said to be bad and not drinkable. Used only for cooking and ablution purposes by the Royal Artillery. Well in a filthy state
11	Near the Band Room, in an arch of the ramparts. Cabook sides and bottom; 21 feet deep; 1 foot of water	Clear, but slightly brackish and unpleasant	Nil	0·66	6·3	25·2	2	Ditto	Trace only	Ditto	41	Considered to be very fair drinking-water. There is a considerable consumption, the ships being supplied
12	In the Gardens of the Government Offices. 16 feet deep; 7 feet of water; half built in with brick; no pump	Clear and tolerably palatable, but slightly insipid	Vegetable débris in the sediment	0·6	12·0	21·6	2	About 6 to 8	Ditto	Ditto	43	Used at one time largely by the married officers. In a dirty condition
13	Private; behind the Military Medical Stores, underneath a shed. 22 feet deep; 3 feet of water; semilunar in shape; cabook sides and bottom	Clear, very brackish, and scarcely drinkable	Nil	0·5	7·5	33·4	1	Ditto	About 3	Ditto	55	Very little used
14	Behind the Artillery Stores in Hospital-street. 23 feet deep; 3 feet of water. Uncovered; sides built in with brick; cabook below	Cloudy, and very brackish	Vegetable débris from a tree growing over it	0·65	7·0	32·0	1	Ditto	Trace only	Ditto	51	Used for the medical stores, by the serjeant of Artillery, in charge, and by Army Hospital serjeant. Well in a very dirty state

* The quantities are given in grains per gallon. The earthy salts are grouped together, comprising those of lime and magnesia.

CHINA.

The China Command was so fully remarked upon in the departmental volume of last year, that it is not considered necessary to make any extended observation on the same subject now, more especially as the conditions have not altered much; and in the Report for 1863 there were included extracts from the proceedings of a Medical Board which investigated the sanitary condition of Kowloon, and which are dated November 1864, the year now under review. Deputy Inspector-General Dick, in his report for 1864, prominently notices the want of accommodation for the wives and children of the soldiers at Hong Kong. He also points out the inadequate accommodation for officers. He says that as many as three officers were living in the same room at one time in Murray Barracks. The night duties continued to press far too heavily on the men. He recommends seven nights in bed as a minimum for European soldiers in Hong Kong. He also strongly recommends the employment of black troops for lightening the duties of the Europeans, as they are so much less susceptible to the baneful effects of the sun and night duties.

Medical Officers renew the complaints as to the unsatisfactory state of the latrines, water-closets, and drainage of the barrack and hospitals at Hong Kong, The Engineers have, on several occasions, endeavoured to remedy the defects, but, in some instances, they are still existing. The power of quinine as a preventitive of miasmatic disease, was tried in the 99th Regiment, but, in the instance in question, without beneficial result. The Surgeon of the regiment. in speaking of Hong Kong in 1864, says, "fevers almost disappeared, and the sick-list was at the minimum of what it had ever been in China; and this improved state was during the three most trying and unhealthy months of the year, viz., July, August, and September." On the 16th September, the 99th Regiment was moved to Kowloon, and he says, "It may also be remarked that, from the day the regiment was ordered to Kowloon, quinine (four grains) was given daily to every man as a prophylactic; but with such exciting and fever-producing influences there existing, even the exhibition of such a large dose had little effect, for, by a return completed from 1st October, 1864, up to January 1865, it was found that only 91 men of the regiment, out of the strength (568) stationed there, had not been attacked with some miasmatic disease during that period."

MEDICO-TOPOGRAPHICAL REPORT OF JAPAN, THE GARRISON OF YOKOHAMA, AND THE SURROUNDING COUNTRY.

By G. P. M. Woodward, Surgeon, 2nd Battalion 20th Regiment.

The empire of Japan has long presented to the thoughtful mind an object of uncommon interest, and this interest has been greatly increased by the mystery with which, for the last two centuries, an exclusive policy has sought to surround the institutions of this remarkable country. The curiosity of Christendom has been on the alert, and the several votaries of various pursuits have naturally longed to add more to what is known of this self-isolated kingdom. Scarce a maritime nation in the civilized world that has not attempted to explore the country. The Portuguese, Spaniards, Dutch, English, French, and Russians, have each in turn sought to establish commercial relations with Japan. The Portuguese and English both so far succeeded that but for themselves they might permanently have retained their positions. The first were expelled; the latter voluntarily abandoned the field.

Japan was first brought to the knowledge of the European world by the celebrated traveller Marco Polo, of Venetian origin, about the middle of the thirteenth century. He had not visited it in person, but he traversed the greater part of China, and had there heard what he related concerning Japan. It was not until the middle of the sixteenth century it was first brought into relations with Western Europe by the Portuguese, and for about a hundred years the intercourse between the Japanese and the outer world was constant and friendly.

The Roman Catholic missions, founded by Xavier, did much towards the conversion of the population; intermarriages took place between the Japanese and the Portuguese, and it seemed highly probable that the entire population would become Christian. In fact the Portuguese had but to proceed prudently, and they would ere long have been the dominant race in Japan. All this prosperity was destined to have an end, occasioned by the ecclesiastics themselves. Swarms of Dominican, Augustinian, and Franciscan friars from Goa and Macao, who were attracted by the flattering accounts of the remarkable success of the Jesuits, soon arrived. The Franciscans and Dominicans quarrelled with each other, and all the orders quarrelled with the Jesuits. To the Japanese convert was presented the spectacle of one ecclesiastic quarrelling with another—of one body of priests intriguing with heathens to defeat another; while the poor native Christian laboured to reconcile the feuds and rivalries of these consecrated belligerents. But this was not all. The pride, avarice, and extortions of the Portuguese laity had become excessive about the close of the sixteenth century. Very many of the clergy quite equalled that of the laity. The native Christians became both shocked and disgusted when they saw that their spiritual instructors were quite as diligent in the effort to save their property as in the endeavour to save their souls. The ecclesiastics treated with open contempt the institutions and customs of the country, and insulted the highest officials of the Government by studied indignities. In 1637 an imperial proclamation decreed that "the whole race of the Portuguese shall be banished for ever." The same proclamation forbade, under penalty of death to those concerned, any Japanese ship, or native of Japan, to depart from the country. It directed that any Japanese returning home from a foreign country should be put to death; that any person propagating Christian doctrines, or even bearing the title of Christian, should suffer; and a reward was offered for the discovery of every priest, as well as of every native Christian. Under these severe edicts the Portuguese were frightened out of the country. The Dutch (who were the sworn foes of the Portuguese) were permitted to remain cooped up in what was really an imprisonment in their factory at Decima; and the Chinese appear to have been allowed to carry on a certain degree of commercial intercourse with their neighbours.

Till the American mission in 1854 nothing satisfactory was known in Europe of Japan, except what was reported by officers, generally speaking physicians, of the factory at Decima. Since then several of the leading powers of Europe have made treaties of commerce with Japan. The Russians and Dutch made such in 1857, and the Americans, English, and French in 1858.

As regards the origin of the Japanese people, an opinion has been expressed by several writers that Japan was colonized by Chinese. Such an opinion, founded on superficial observation, no longer exists. No one competent to speak instructively on the subject has ventured to deduce the Japanese from Chinese origin. The structure of the language of the two people is essentially different. It is true that certain Chinese words, introduced by the Chinese, may be heard from the lips of a Japanese, modified, however, in the pronunciation. It is also true that the Chinese dialect of the Mandarins forms a species of universal language among the learned—a sort of Latin in the extreme East that is understood by the highly educated, not only in China but in Coria, at Tonquin, and other parts, and also in Japan; but so little is the affinity between the primitive language of Japan and that of China that the common people of both countries, neighbours as they are, cannot understand each other. The Japanese have an alphabet, or rather a syllabarium of their own, constructed on a principle entirely different from the Chinese idiograph.

Modern ethnologists seem disposed to assign to them a Malay origin; others, judging from language, consider them of the Mongol stock. Very close affinities cannot probably be found between the Japanese and any other Asiatic language, but in its grammatical structure the Yomi of Japan is by some thought to be most analogous to the languages of the Tartar family. In the present state of our information, the more commonly received opinion seems to be that the Japanese are of Tartar origin; but they certainly do not all possess the Tartar complexion or physiognomy. The common people are of a yellowish colour all over, sometimes bordering on brown, and sometimes on white. The labouring classes, who in summer expose the upper parts of their bodies, are

always brown. Their eyes are not round, but oblong, small, and sunk deep in the head. In colour they are generally dark brown or black; and the eyelids form in the great angle of the eye a deep furrow, which gives them the appearance of being sharp or keen sighted. Their heads are large, and their necks short; their hair long, black, and thick; their noses, although not flat, are yet rather thick and short. In the interior, the people, mostly agriculturists, are a larger race, with broad and flattened countenances, prominent cheek bones, large space between the inner angles of the eyes, broad and very flat noses, with large mouths, and a reddish-brown skin. The women of the upper classes, who are protected from the influences of the atmosphere, have generally a fine and white skin.

The country which, by a strange caprice, we call Japan—a name entirely of our own invention—is not altogether unlike our own country. It is of somewhat similar dimensions, and, as far as our vague information goes, the population cannot be very different. As to the extent of the kingdom, it consists of a great number of islands, said to be 3,850 in number, lying off the eastern coast of Asia, and spread over that part of the ocean which extends from the 129th to 146th degree of east longitude from Greenwich, and is between the 31st and 46th degree of north latitude. The chain to which they belong may be traced on the map from the Loo Choo Islands to the southern extremity of Kamtschatka, and from the latter peninsula, through the Kurile Islands, to the promontory of Alaska. They are in the line of that immense circle of volcanic development which surrounds the shores of the Pacific from Tierra del Fuego around to the Moluccas.

Japan possesses many external advantages which fit her for taking hereafter a high position as a mercantile and manufacturing people among the nations of the earth. Possessing a fine climate, a fertile soil, a region of rich mineral wealth, a country producing every variety of agricultural produce, a coast indented with magnificent harbours, a land of picturesque landscape beauties, and an industrious population, skilful and imitative in the productive resources of the country, the empire of Japan contains within her own borders everything needful to supply the wants or to minister to the luxuries of her people.

The kingdom is divided into Japan Proper and the dependent islands. The first-named division consists of three large islands—Kiusiu, Sitkoff, and Nipon; and the whole empire contains about 160,000 square miles, of many parts of which we know nothing.

Their coasts are difficult of access, and shallow seas and channels, with sunken rocks and dangerous whirlpools, added to winds as variable as they are violent, have interposed most serious obstacles to nautical exploration, so that we have yet much to learn of the navigation of the waters around the islands of Japan.

The physical aspect of these principal islands is composed of a succession of mountains, hills, and valleys. In general the hills come down near to the sea-shore, leaving but narrow strips of land between the water and their bases. It is considered that level plains of some extent exist in the interior. The hills, however, are not sterile; and covered, as most of them seem to be, with fruits of cultivation up to their summits, bear witness alike to the numbers and industry of the population. Mountains, however, are to be found as well as hills, nor is it surprising that some of them should be volcanic.

Westward of the bay of the Yeddo rises Fusiama Mountain, with its summit whitened by perpetual snow. It was once an active volcano, but it has long been extinct. The estimated height of the edge of the crater above the level of the sea is 13,977 feet, and the highest peak 14,177 feet. The latest eruption recorded was in 1707. The tradition is that the mountain itself appeared in a single night from the bowels of the earth, a lake of equal dimensions making its appearance at Miako at the same hour.

Of the climate of Japan it is not possible to speak with much certainty; but, judging from the past experience of foreigners who have enjoyed very good health, it is considered most agreeable and salubrious. In the southern parts of the kingdom it is said to be not unlike that of England. The winter, though less severe than in the north and opposite coast of China is still a very unmistakeable winter, with ice and snow; while at Hakodadi, in the northernmost island of the group, it is almost Siberian, with long-continued

and heavy falls of snow, the thermometer standing many degrees below zero The sun during the hottest days of summer is very much less intense in its heat than on the neighbouring coast of China. The thermometer in the shade ranges from 75° to 85°, and averages 80°, between the morning and evening; while it is sometimes below 70° at night. There is what the Japanese call Satkasi, or the rainy season, in June and July; by this, however, it is only meant that the rains are then most abundant; for, in point of fact, they are frequent all the year round, and the weather appears to be variable. No part of the ocean is subject to heavier gales than the sea around Japan, and the hurricanes are terrific, fogs are very prevalent, thunder-storms are common, and earthquakes are frequent.

A good-humoured, contented and happy, as well as a laborious, industrious race, the Japanese seem. They are, upon the whole, a cleanly people, wash often, wear little clothing, live in houses open to the air, and look on wide and well-ventilated streets, where nothing offensive is allowed to rest. In all these things the Japanese have greatly the advantage over other Eastern races, and notably over the Chinese, whose streets are an abomination to any one possessing eyes to see, or a nose to smell with. The general condition of the people closely corresponds to, and, indeed, is the natural complement of their moral state. Their habits of life are evidently simple in the highest degree. They are poor, but they have hardly any wants, and such wants as they have appear to be well supplied. A Japanese requires very little personal property. A house containing generally three or four little rooms, in which clean mats are put, measuring six feet by three, stuffed with fine straw and beautifully made, form a sort of reticulated carpet for rooms of any size, a few lacquer cups and saucers, with as many trays on stands, and a large tub to bathe or wash in, constitute the whole furniture of a well-furnished house, from the Daimio, whose revenue is estimated at a million measures of rice, to the little shop keeper or peasant who lives from hand to mouth. In the kitchen, which is generally the best furnished apartment in the house, a few buckets, two or three copper or iron pans, and a moveable stove, with a large pan for the daily rice and hot-water, supply all the means of cooking. At night he rolls himself up in a wadded quilt and sleeps on a mat, with a pillow of the smallest dimensions under his head. He wants neither tables nor chairs, for he habitually sits on his heels.

The higher orders of Japanese society enjoy certain privileges of dress, they carry two swords, and wear a species of loose petticoat trowsers, which none of lower rank dare to put on. The dress of the lower classes is simple in the extreme, consisting of a coarse cotton robe, loosely put on, just coveringthe hips: during the hot months they go almost naked. Among all classes, except priests and doctors, the front part and the crown of the head are shaved, and the hair on the side and back of the head is collected into a top-knot, glued with a kind of bandoline, and plaited into an artificial comb with its end bent upwards, neatly fastened and projecting forwards. Sometimes only the crown is shaved, and the forelocks are drawn backwards into the central comb.

The women wear their jet-black hair gathered tightly over the temples and forehead, and carried back so as to form a high-tufted crown, through which large metal hair-pins are passed. Those of the upper class are kept so secluded it is difficult for a stranger to obtain a sufficient opportunity to investigate their peculiarities very thoroughly.

The Japanese women, always excepting the disgusting black teeth of those who are married, are not ill-looking. The young girls are well formed and rather pretty, and have much of that vivacity and self-reliance in manners, which come from a consciousness of dignity derived from the comparatively high regard in which they are held. The non-existence of polygamy is a distinctive feature which pre-eminently characterizes the Japanese among Eastern nations.

In rainy weather the Japanese wear a covering made of straw, which being fastened together at the top is suspended from the neck, and falls over the shoulders and person like a thatched roof. Some of the higher classes cover their robes with an oiled paper cloak which is impermeable to the wet.

They hardly ever wear shoes or slippers that are not made of plaited straw, they consequently last but a little time. But they are made in immense

numbers, cost but a trifle, and may be bought in every town and village in the empire. The pedestrian, therefore, throws away the old pair by the road-side, and buys new ones as he goes along; while the more provident man takes two or three pairs with him on starting. Immense numbers of these discarded shoes may be found on the sides of all the roads. In wet weather they wear under the shoe a wooden clog, which is attached to the foot by ties of plaited straw. Though they are generally neat and cleanly in their habits, it must not be supposed that this favourable verdict is given so much after an European as after an Asiatic standard of judgment. Even in the matter of personal cleanliness there is a strange combination of opposite qualities. Bodily ablutions and unwashed clothing mark the habits of one and the same individual. Their garments (which they sleep in) are worn for months, or even a longer period, without being washed. The bulk of the population appear to live roughly, simply, and coarsely. With their staple food of rice, the lower classes eat fish and salted greens and vegetables of all kinds, as turnips, lotos, and other roots. The use of this half-salted, half-putrid vegetable diet, and the disproportionate consumption of fish, cause diseases of the cutaneous order to be very prevalent, particularly porrigo and scabies, the latter is very inveterate. It is almost impossible to get a domestic servant free from this loathsome malady.

The most striking fact about Japan is the scantiness of our information on it. Not only have we no acquaintance with Japanese literature, but we can hardly be said to know whether such a thing exists; indeed, Sir Rutherford Alcock implies that no Englishman is really well acquainted with the language.

Of the religion of the Japanese we have a little, and only a little, more knowledge than of their literature. Both Buddhism and Confucianism have been introduced into the country; Buddhism about the sixth century of our era, and Confucianism in the first. The Sintoo creed was earlier than either, but hardly anything at all is known of it. There is a surprising resemblance of the Buddhist ceremonies and creed to those of the Roman Catholic Church, it is represented to be little better than a set of idle ceremonies and puerile superstitions, and that it exercises next to no practical influence on the conduct of the population. This is the character given of Buddhism wherever it prevails.

They have some very obscure and imperfect notions of the immortality of the soul, and a future state of bliss or misery. But so far as I have seen and heard, the educated classes scoff at all such doctrines as fit only for the vulgar and the ignorant.

Of the moral condition and character of the Japanese something more definite is known than of their religious belief or their literary attainments. Tried by our standard of morals, there can be no doubt that they are a very wicked people. Their principles and practice as to the relation of the sexes is such that no delicacy, no modesty, no sense of shame, appears to be recognised among the courtesies of life; which makes it difficult to understand how any of the domestic virtues are possible among them.

It is a common practice for young females to be sold by their venal parents, and consigned to pass their early years in professional prostitution; after which they return to their parents, and many without loss of character or standing. Their language and amusements are also exceedingly indecent. Besides this they are inveterate liars: one of the five commandments of Buddhism is directed against this vice, but it is universally practised amongst them, and that without anything approaching to shame. They all lie from the highest to the lowest, and when found out simply begin again unblushingly. The public bath-houses, which are very numerous, are an important institution in Japan. They are the ordinary resort of the poorer classes, who for a few cash procure the national luxury of a warm bath. Towards the close of the day and the early hours after sunset, young and old of both sexes, and children in arms, are intermingled in one shameless throng of bathers, without signs of modesty or any apparent sense of moral indecorum. And here all the gossip of the neighbourhood and town is ventilated. Some persons palliate this custom of promiscuous bathing in public by assuming the innocent simplicity of their primitive habits, and dwelling on a wide difference of every country in the conventionalities of moral right and wrong. The obvious reply to this charitable theory is, that the Japanese are one of the most licentious races in the world.

Apart from the bathing scenes, there is enough in the popular literature, with its obscene pictorial illustrations, to prove the licentiousness of taste and practice among a certain class of the population, to be not only disgustingly intrusive, but disgracefully indicative of foul corruption.

They are also altogether indifferent to human life. The country is full of two-sworded men, the retainers of the Daimios, who are ready on any and every provocation to murder any one at their master's orders. The strange practice of committing suicide whenever an event discreditable to character, takes place, is most characteristic. It is probably unexampled in any other part of the world. Even in China no evidence is to be found of so great a contempt for human life as it appears to indicate.

This is the bad side of the Japanese character, and certainly it is bad enough; but it is very easy to take too dark a view of the race to which it applies. The faults of the Japanese all resolve themselves into the one great fault of having too low a standard of morality. With their views as to the position of women and the obligation of truth, it would seem that it would be impossible to expect from them what we should regard as the beauty of purity; but their contempt of life, whilst it indicates a certain roughness and brutality, indicates also a certain sort of nobility. A man who is always ready to rip himself up on the slightest occasion, and who feels bound to do so rather than endure anything approaching to a blemish on his reputation, must at all events have considerable sensibility, and acknowledge the existence of something equivalent to moral responsibility in a very marked form. As to lying and indecency, they are to a great extent, relative. If people do not expect sincerity, and do not understand the beauty of purity, they stand, of course, on a lower level than those who do; but they may, nevertheless live with considerable comfort, treat each other with good-humour and fairness, and be temperate, brave, and industrious. With regard to truth, also, it must be remembered that the estimate formed of a people like the Japanese by foreigners is of necessity less trustworthy on this head than any other. Unwelcome guests who have forced themselves on people weaker than themselves are pretty sure to have an intense attraction for all the lying and cheating in the country. These things are the natural defences of the weak against the strong. The acts of violence which are so prominent a feature in all our relations with them, and in some of their relations with each other, appear to be the characteristic rather of a class, viz., the retainers of the half-independent nobility, than of the nation at large. These retainers, often drunk, and always insolent, are extremely dangerous both to natives, to foreigners, and to the unlucky animals which they happen to meet in the streets. Many of them cowardly enough to strike an enemy in the back, or cut down an unarmed and inoffensive man, but also supplying numbers ever ready to fling their own lives away in accomplishing a revenge, or carrying out the behests of their chief. They are all entitled to the privilege of two swords, and are saluted by the unprivileged (professional, mercantile, and agricultural), as "Sama," or lord. The hilts of their two swords are at least a foot in advance of their person, handy, to all appearance, for an enemy's grasp. One is a heavy two-handed weapon, pointed, and sharp as a razor; the other short, like a Roman sword, and religiously kept in the same serviceable state. In the use of these they are no mean adepts. They seldom require a second thrust with the shorter weapon, while with the longer weapon, they sever a limb with a blow. I never witnessed, either in the Crimean or Indian campaigns, such horrible wounds as are inflicted by the Japanese two-handed sword,—limbs completely severed with a single cut, as was fatally proved but very recently in the case of two officers of the 2nd Battalion 20th Regiment, who were barbarously murdered by Japanese within the limits assigned by treaty to foreigners.

The most remarkable thing in Japan is, no doubt, the system of government. Many points about it remain obscure, but some leading features appear to have been pretty clearly ascertained. There are two Emperors, one the Mikado or spiritual Emperor, and the other the Tycoon, or temporal Emperor. The residence of the Mikado is at Miako; that of the Tycoon is at Yeddo. Each is surrounded with Imperial splendour. The one is monarch *de jure*, the other is Emperor *de facto*. The Mikado retains the empty title of sovereign, and his assent is still deemed requisite to give validity to Imperial acts of national importance, but he has not a particle of political power. He lives in a state of

perpetual imprisonment from birth to death, shut up in his little principality of Kioto, with the revenues of which, and the rich presents sent him by the Tycoon, he must be content, being viewed as a semi-divine personage too holy and wonderful to be permitted to mix with any of the common affairs of life. Descended from the "Sun Goddess," he is the reputed incarnation of the tutelary divinity of the empire. As to the Tycoon, he is, for practical purposes, the King of the country, commands its revenues, and has at his disposal an army. He has, however, several titular superiors; and, as far as can be ascertained, the legislative power resides not in him, but in a council of the Daimios, or hereditary nobles, to whom he proposes new laws, which have to be approved of by them and then presented to the Mikado. It seems, however, that the Tycoon and Mikado together may overrule the Daimios.

These Daimios form the most remarkable feature in the Japanese body politic. They are the hereditary nobility of the empire. There are 360 of them, and they possess revenues varying from 769,728*l.* a-year down to 6,400*l.* These revenues are computed in rice, and seem to be raised by a tax or tribute of one-sixth of the gross produce of the lands of their vassals. Their relations to the Tycoon are very obscure. In their own territories they are said to be absolute masters, with power of life and death over their subjects. They are obliged to pass half the year at Yeddo, and this renders necessary a long journey there and back with an immense retinue of retainers,—sometimes several thousand. Whoever meets a Daimio on such a journey is bound to prostrate himself on the ground, and is liable to be cut to pieces if he does not. Of their mode of life and pursuits little or nothing is known. They appear to spend their revenues just as the old feudal nobility of Europe did, in maintaining vast numbers of perfectly idle retainers, who swarm about the country armed with two swords. These retainers have a considerable resemblance to the retainers of early European history. They wear the heraldic cognizance of their chief, and have on all occasions to do his bidding. Everyone is obliged to be under the authority of some lord, just as was the case in our own country in Anglo-Saxon times, and they possess the right of solemnly renouncing their lord's service, when they become lonins, or outlaws. It is considered an honourable thing to take this step before they undertake any desperate enterprise, as it frees their lord from all responsibility for their acts.

With the exception of a few Government officers, principally military, there seem to be no public authorities in Japan besides the Daimios. It is an old observation, that they have no lawyers, and it would seem that they have hardly any definite laws. It appears they have criminal laws, which inflict the punishment of death for almost every offence; but very little is known of the mode of their administration.

The hereditary classes in society are said to be eight in number, and, except under very peculiar circumstances, no one can leave, through life, the class in which he has been born without a forfeiture of respectability.

Class 1. These are the hereditary vassal princes of the empire.

Class 2. These are the hereditary nobility, below the rank of princes. These hereditary nobles have generally sub-vassals on their lands who are bound to furnish their several quotas of fighting men. Out of this class Governors of provinces, generals, and officers of State are selected.

Class 3. This includes all the priests of the kingdom, seemingly those of the ancient religion of Japan, Sintoo, as well as of Buddhism.

Class 4. This is composed of the vassal soldiers furnished by the nobility of Class 2.

These four classes are the higher orders of Japanese society, and enjoy certain privileges of dress. They carry two swords, and wear a species of loose petticoat trousers, which none of lower rank dare to put on.

Class 5. These constitute the higher portion of the middle classes, such as medical men, Government clerks, and other professional men and employés.

Class 6. Merchants and shopkeepers, who rank low in Japan, no matter what may be their wealth. Any one of the classes above this would be disgraced for ever should he engage in any trade or traffic. The richest men in the empire belong to this class, and yet they are not permitted to expend their money in a luxurious or ostentatious style of living. Sumptuary laws impose restraints which they dare not violate. They are not allowed to wear even the

single sword, unless they purchase the privilege by becoming the followers of some great lord, at the price of a considerable sum of money.

Class 7. This is composed of retail dealers, little shopkeepers, pedestrians, mechanics, and artisans of all descriptions save one, to be presently mentioned.

Class 8. This consists of sailors, fishermen, peasants, and agricultural and day-labourers of all kinds. The peasants seem to be a species of serfs, attached to the soil, like the ancient villeins of feudal times, and belong to the land-owner.

The exception alluded to among mechanics in Class 7 consists of tanners, curriers, leather-dressers, and, in short, of every one in any way connected with the making or vending of leather, and is placed under ban or interdict. Those of this proscribed class cannot dwell in the towns or villages that are occupied by the other classes. They are not even numbered in the census of the population. Out of this class come the public executioners and gaolers throughout the empire.

As regards the elaborate system of espionage which exists in Japan, there prevails the remarkable feature of making officials serve in pairs, as spies upon each other. Everybody is watched. No man knows who are the secret spies around him, even though he may be, and is, acquainted with those that are official. The Emperors are not exempt. The Tycoon has his minions about the Mikado, and the Grand Council have theirs about the Tycoon. This wretched system is even extended to the humblest citizens. As to the spies themselves, they are of every rank in life below that of the hereditary princes. The highest nobility dare not shrink from the occupation, and even stoop to disguise themselves, the more effectually to perform the degrading office.

Such are a few of the more salient points in the condition of this strange people. There is little wealth and no misery in Japan; and if equality is an object, they appear to possess its advantages in an unusual degree. Even the aristocracy, so far as we know their habits, are much on the same footing, as far as the command of luxuries and physical comforts is concerned, with the bulk of the population.

The Japanese are a wonderfully ingenious people. They fully appreciate the superiority of Europeans in point of knowledge, and are ready and willing to learn all that Europeans can teach. Their power of imitation amounts almost to genius. There is nothing which they cannot make if they have a good model before them, and there are some things which they can do, and which we, with all our science, cannot.

Progress in Industrial Arts and Extent of Civilization in Japan.

Metals.—They work well in iron, copper, gold, and silver. Their power of blending and producing artistic effects out of mixed metals, is very beautiful. The art is scarcely known in Europe.

Their smaller fancy objects, such as brooches and clasps, are admirably executed. In all the figures, the national character is represented with perfect truth and expression. The same remark applies to their enamels, and their carvings in ivory of groups of figures and animals.

They make steel, and temper their swords admirably.

Clocks and watches are also made by them; but in these they are not entitled to the merit of invention; they are copied from European models. The same may be said of their astronomical instruments. They also manufacture excellent metallic mirrors. They are very expert in carving metal, and can cast metal statues. Some of the latter are the largest and finest I have ever seen in any part of the world.

Wood.—No people work better than they do in wood and bamboo, and they possess one art in which they excel the world. This is in lacquering wood-work. In this operation they select the finest wood of fir or cedar to be covered with varnish. They get the gum from which they prepare the varnish from the *Rhus Vunicifera*,—a tree from 15 to 20 feet in height, grown exclusively for the sake of its sap,—and from its seed oil and wax is pressed.

Glass.—This they manufacture very extensively in Yeddo, there being a large demand for it in the foreign concession.

Porcelain.—This they make to great perfection, many of the specimens are

very beautiful and delicate; but for some reason or other it is difficult to obtain good samples now.

Paper.—This was made by the Japanese as early as the beginning of the seventh century. An immense quantity of it is manufactured; it is of different qualities, some of which are soft and flexible as our cotton cloth. Indeed, that used for handkerchiefs and other domestic purposes might be mistaken for cloth, so far as toughness and flexibility are concerned. It is made from the bark of trees, particularly the *Broussonetia Papyrifera.* This shrub is grown exclusively for its bark, which forms the chief material used for paper-making; about sixty-seven different kinds of paper are made. They are not unacquainted with the process of manufacturing paper from cotton rags; but that made from the bark is preferred.

Woven Fabrics.—They make silk, the best of which is superior to that of China; it is the principal export and realizes a good profit in the home market. Their cotton fabrics are coarse; woollen cloths are not made as they have no sheep or goats, and therefore lack materials to make them.

Leather.—They convert the skins of certain animals into this article; but, as I stated before, all those who have anything to do with the making or vending of leather are outcasts from all the rest of the population, and universally proscribed.

Agriculture forms the chief occupation of the lower classes. With the exception of that portion of the ground covered by the roads, and by the woods left to supply timber and charcoal, nearly every foot of ground to the tops of the mountains is cultivated. Land is brought to a very high state of cultivation, arising in a great measure, first, from the country having to provide for an annually increasing population; and, secondly, from the fact that all rents are paid in produce. The revenue of the princes, and other proprietors, is derived almost solely from their landed estates.

The Japanese measure is termed koku, weighing about 100 lbs. English. A landed proprietor calculates his income by kokus; his retainers and attendants are paid in rice, and thus but very little money passes. Each estate is surveyed once or twice a year, when an approximate value is placed on the crop, and at the time of harvest each tenant pays six parts in ten of whatever the valuation was. The crown-tenants it is said only pay four-tenths. The land is exceedingly fertile, a friable loam extending to a very considerable depth, and easily worked. Of animals to assist in culture they have the horse, ox, and a large species of buffalo, which is trained to draw carts and carry heavy goods on the back. They plough with both the ox and cow. Of milk and butter they make no use. When they cannot use cattle to plough, as on the steep sides of hills, men are substituted; and sometimes the plough is laid aside, and all the labour in preparing the earth is done by hand. Their chief grain is rice, of which they are said to produce the best in all Asia. It is often planted in terraces raised with incredible labour along the face of hills, supported by walls from six to nine feet high. The great number of rivulets and streams of water, which are found alike in all parts, renders the growth everywhere practicable. There is one particularly striking feature in every Japanese farm, viz., the cleanliness and order everywhere prevalent. Each man seems to take a pride in keeping his land in perfect order, and clear of everything in the shape of weeds. The use of manures is well understood and appreciated. Human manure is the commonest and that most generally in use. It is given in a liquid state during the younger stages of the growing crop. Horse-manure and sea-weed are both used, but the latter only suits a certain few crops. The chief crops consist of rice, wheat, barley, millet, cotton, beans, buckwheat, rape, peas, hemp, tobacco.

Next to rice, in importance, is the tea-plant, which has been cultivated in Japan since the ninth century, when it was introduced into China. Immense quantities of it are now produced, for its use is universal. The plantations are situated as far as they conveniently can be from all other crops and from human habitations, lest the delicacy of the tea should be impaired by smoke or any other impurity. They manure the plants with dried anchovies, and with the juice pressed out of mustard-seed.

The domestic animals of Japan are very few; they are all stall-fed. The inhabitants never eating animal food has been the cause of their not paying due

attention to the breeding of animals. Horses of a small breed are plentiful. They are used exclusively (with the exception of riding-horses for the high-officers of the land) for purposes of draught. Sheep and pigs have both been introduced by foreign nations at various times, the former do not thrive, the latter are now plentiful.

Horticulture.—In this department the Japanese are very skilful. They possess the art in a wonderful degree, either of dwarfing, or of unnaturally enlarging all natural productions. As an evidence of the first, may be seen in the miniature gardens of the towns perfectly mature trees, of various kinds, not more than three feet high, and with heads about three feet in diameter. These dwarfed trees are often planted in flower-pots.

Internal Trade by Land and Water.—This is large, resulting from the variety of produce afforded by the variety of climate, and from the immense population. In many places town joins on to town, and village to village for miles, so that the road looks like a continued street. The highways are almost one continuous line of villages and boroughs.

As to the variety of climate and produce, the southern part of the kingdom, reaching down to the 24th degree of north latitude, produces the sugar-cane and the tropical fruits; while the northern, extending as high as fifty degrees, yields the products of the temperate zones. The mineral wealth of the country is very great, the manufactures numerous, and the internal trade active. On the roads, in all parts of the empire, stables, inns, tea shops, and other resting-places, occur at intervals, and the distances are regularly marked.

Scientific Knowledge.—Some principles of civil engineering they understand and apply, but of military engineering they know nothing. They know something of mathematics, mechanics, and trigonometry. They construct very good maps of their country, and have a fair knowledge of geography, the use of the globes, and navigation.

There are both primary and secondary schools in every part of the empire. In the former boys and girls are mixed together at an early age, and receive a common course of elementary instruction. In the more advanced or secondary schools only boys receive their education, and the master is supported by the payments of the pupils, varying from half an itzebu to five itzebus a month. In some cases the poorest class of people are able to afford the payment of only two copper teu-po, or one-eighth of an itzebu, a month, *i. e.*, a monthly fee of about twopence. The ordinary text-books of Chinese schools are used in Japan, and the classics of Confucius and Mencius are the universal basis of their education.

Private tuition prevails very generally in the houses of the Daimios and officials of high rank. Academies of a superior class, named Terakoya, are held in the halls of the gentry, at the houses of merchants, or within the precincts of the temples, in which penmanship, composition, and arithmetic, on the principles of the Chinese swanpan or acabus, are taught by a higher class of tutors.

In the female schools Japanese girls study, among other accomplishments, music and dancing, and learn to play on the guitar, the flute, the harp, and the tambourine. Music, painting, sculpture, and poetry, are yet in their infancy, and seem incapable of advance. Their music is without melody, and their landscapes without perspective, light, or shade. There is an astronomical school in Yeddo, where the sons of Daimios are instructed. There are also places in which instruction in the military art is imparted; and Japanese youths are practised in fencing and sword exercise.

Medicine.—The most interesting part of their public system of instruction is to be seen in the medical schools which are dispersed over the country. Nosology and materia medica are, I believe, branches of professional study. Some writers on Japan even assert that a regular system of medical apprenticeship, extending over a period of five years instruction, exists, and that after that period permission to practice is granted to competent students. During their medical education they receive the bodies of executed criminals for anatomical dissection, which the Government hand over to the medical schools for this purpose.

It is probable that the influence of the Dutch physicians at Decima may have led to the introduction of anatomical dissections, and the general improve-

ments of surgical science, among a race peculiarly imitative and disposed to profit by the observation of foreigners.

Medical works are constantly appearing, and translations are made of such as they can obtain in the Dutch language, which they best understand.

Phlebotomy and cupping are much practised by them. Acupuncture and moxa are both extensively used. Most of the natives of their own free choice undergo the latter operation at least once every spring, as a preventive measure; it is rare to see a man stripped without finding a long row of scars burned in on each side the spine an inch or two apart. It seems to be considered a universal specific, even the accoucheur calls in its aid, and is directed to burn "three cones on the little toe of the right foot to facilitate delivery." There are four hundred and four recognised kinds of disease. Their drugs are mostly animal and vegetable; they are too little acquainted with chemistry to venture upon mineral remedies. They study medical botany with great attention, and their remedies are said to be generally efficacious. Some of their medicinal preparations are very remarkable, producing most singular effects. The marvellous effects of the celebrated Diosa powder, given when at the point of death, to prolong life, and prevent rigidity of the limbs and rough handling in case of death, that the body may adapt itself to the tub in which it is enclosed, prove that the Japanese are but little advanced in medical science.

The number of persons to be commonly met with who are deeply pitted with small pox, proves that vaccination is not much practised; but several Japanese with whom I have spoken on the subject, assure me that vaccination is now much practised in Yeddo, and that they are quite aware of the great importance of it. As the Japanese have entered on the path of improvement, and show a willingness to learn from foreign physicians, conscious of their own inferiority, they are likely at no distant period to evidence a manifest improvement in medicine and surgery. Although the labouring classes and artisan population present the appearance of physical hardihood and bodily strength, they soon become aged in constitution, and at thirty years have the premature old look of men of forty-five. The quality of their food is ill-suited for sustaining them under hard toil for daily subsistence. Intoxicating spirits forms an additional source of early debility and decay. Nearly one-half of the whole population are more or less inebriated by sakee at 9 o'clock every evening.

Strumous and syphilitic ophthalmia are unusually frequent. Blindness is very common, partly to be attributed to the practice which prevails among the people of having their eyelids turned inside out, rubbed over, titillated, and polished by a small copper spatula, every other day on visiting the barber to have their heads shaved.

Cholera has annually made its appearance for the last ten years. The United States' frigate "Mississippi" is, I believe, correctly reported to have brought over the disease—a first fatal fruit of the treaty and their extended relations with foreigners! It swept many thousands from their cities; they say 200,000 from Yeddo alone. It is said, however, that it was not the first visitation, and that they had it in 1818. Pulmonary consumption does not appear to be prevalent. Siminoseki, among other titles to fame, enjoys the questionable distinction of originating the "social evil," one of the national institutions of Japan, as it exists at the present day. The Japanese system of licensed brothels as a source of revenue to the Government, and the sad undermining of moral principle caused by the facilities of concubinage with native women, have combined in producing, among a considerable portion of the foreign community, a state of dissoluteness exceeded in no part of the East. Venereal is the universal scourge, aggravated by neglect. The disease secretly consumes them, devastating every class of society, the innocent and guilty alike, rendering almost useless and hopeless the remedy of European medical art. One-half of the female sex, at one period or other of their lives, and one quarter of the infants at the time of birth, are visited with its marked effects. Half of the diseases which afflict and destroy the Japanese population are stated to originate in one and the same cause.

Cutaneous diseases are also very prevalent. Neither hospitals, dispensarie nor lunatic asylums exist in Japan.

Natural Productions.

The mineral wealth of Japan is very great, and is likely to prove hereafter no inconsiderable item in foreign commerce. The Japanese Government manifest the greatest jealousy of our demands, and an insuperable repugnance to the produce of any of their mines being exported, owing to the avidity with which foreigners, on the first opening of the Japanese ports, bought up the gold coins for export, and awakened the jealous fears of the native Government, doubtless mindful of the immense profits of the Portuguese traders in former times from the export of their precious metals, and apprehensive of a scarcity of gold in the country. The oblong, long, flat, thin piece of gold coin, called a kobang, previous to the opening of foreign trade, was worth only four or five silver itzebus, and is now valued at thirteen itzebus, the relative price of gold to silver having thus been tripled.

Gold is found in many parts of the empire. Sometimes it is obtained from its own ore, sometimes from the washings of the earth or sand, and sometimes it is mixed with copper. The quantity in the country is undoubtedly great. Silver mines are quite as numerous as those of gold. Copper abounds throughout the whole Japanese group, and some of it is said to be not surpassed by any in the world. Quicksilver is said to be abundant: it has never been an article of export. Lead also is found to be plentiful. Tin has been discovered in small quantities, and of a quality so fine and white that it almost equals silver; but of the extent of this mineral little is known, as the Japanese do not attach much value to it.

Iron is found in three of the provinces, and probably exists in others. The Japanese know how to reduce the ore, and the metal they obtain is of superior quality, of which they make swords unsurpassed in excellence.

Coal, of which they are the least careful, is very abundant. It requires working to be available for steamers. They possess much better than any they have allowed to find its way to the ports.

Native Sulphur.—In a region so volcanic, this is, as might be expected, an abundant mineral. In some places it lies in broad deep beds, and may be dug up and removed with as much ease as sand. A considerable revenue is derived by the Government from sulphur.

Precious Stones.—No diamonds have been found; but agates, carnelians, and jaspers are met with, some of them of great beauty. But the wealth of the kingdom in precious stones is imperfectly known, as the Japanese are not lapidaries.

Pearls.—These are fished up on nearly all parts of the coast, and are frequently large and beautiful.

Crystals are also plentiful, and considered very valuable.

Vegetables.—These are considerable. Great attention is paid to their growth, in consequence of their forming so large a portion of the daily food. Liquid manure is much used to bring them to a large size. From this cause, to a great extent, is to be attributed the great want of flavour in all Japanese vegetables.

Fruit Trees.—Of these there is a great variety. Generally speaking fruits are not good: the want of flavour is the great fault. No attention is paid to improving them. Both the climate and soil are very favourable to their growth, and with proper attention to the subject the fruit of Japan ought to equal any in the world.

The Flora is very remarkable for the great abundance of evergreens; four-fifths of the plants belong to this class, so that even during the winter months the country has a clothed and cheerful aspect. Coniferous plants play a conspicuous part. There is a great variety, many of which are peculiar to Japan. The assortment of showy flowering plants is not so great as might be expected, but for this the abundance and variety of foliage fully compensates.

The Japanese are great amateur gardeners. Every cottage of any size has its garden attached to it. Plants are brought from all parts of the country, and high prices often paid for rare specimens.

Timber Trees.—Of these there are a great variety; the most common are the fir and cypress; and so sensible are the Japanese of the necessity of preserving their timber trees, that neither of those above named can be cut but by permission of the local magistrate; and the law requires that for every full-

grown tree that is felled a young one must be planted. The cedar grows to an immense size, sometimes more than eighteen feet in circumference.

There is probably no country in the world, of the same area, which produces so great a variety of Conifers as the group of islands comprising the empire of Japan. From Nagasaki in the south to Hakodadi in the north, Conifers are everywhere abundant and in great variety. It is more than probable that the numerous mountain ridges of the interior produce a great number of entirely new and as yet undiscovered species. The Japanese are great admirers of evergreens, and great trouble is taken to cultivate them to the best possible pitch. The greater portion of the timber used for building, and for all ordinary purposes, is that of coniferous trees. Conifers are also employed very largely for ornamental purposes. There is scarcely a garden that does not contain specimens of them, cut and trained into the most grotesque forms. On either side of the main roads are very generally planted *Pinus deusiflora* and *Massoniana*, *Cryptomesia Japonica*, and *Thugopsis dolabrata*. Altogether Conifers constitute the most useful and the most generally employed trees in Japan.

Ferns.—Of these there is a great variety, many of which are very rare and much prized.

The principal articles of export are—raw silks, tea, vegetable wax, and oil; and manufactures of silk, copper, and lacquered ware; considerable quantities of tobacco, paper, camphor, flour, peas, beans, edible seaweed, isinglass, dried oysters and limpets, with various other articles, are shipped for the China markets.

Topographical Report of Yokohama and the surrounding Country.

Along the western side of the Bay of Yeddo, from its mouth, where it opens into the Gulf of Yeddo, to the capital, there is almost a continuous range of towns and villages. The only breaks in this otherwise uninterrupted scene o populousness are the projecting spurs of the highlands, which, presenting less advantage for habitation, naturally prevent the erection of dwelling houses. These promontories, however, are covered with batteries, which are more formidable in aspect than in reality; for their guns are but of small calibre, 18 or 32 pounders apparently, and the defences slight in construction.

Yokohama is one of these numerous and populous villages, and is situated at the head of a small armlet of the bay which is formed by Point Hope on the south-east, and the neck of land extending north-east from Kanagawa to the suburb of the city of Yeddo, termed Sinagawa.

Yokohama is situated on a low flat piece of ground on the edge of the bay, in the midst of a marsh, and cut off from the mainland by a canal which completely surrounds the concession, and separates and confines the European inhabitants in the enclosed quarter.

The Japanese Ministry exhausted all the ingenuity of which they are masters in trying to evade the necessity of carrying out their engagements, or, if that were impossible, to reduce the evil to the smallest dimensions. They therefore formed a resolution to locate foreigners, not at Kanagawa, where the treaty stipulated, but at Yokohama, on the opposite side of the bay, a situation admirably chosen for isolation and espionage. The Government went to vast expense in building a causeway across the salt lagunes and the marshy ground for nearly two miles, to shorten the distance and afford a certain and direct means of communication with the high road at Kanagawa. The foreign merchants preferred this new Decima-like settlement to the opposite side of the bay, there being greater facilities for loading and unloading of ships, the water being deeper, and the landing from boats more convenient than at Kanagawa, where the water is very shallow, and the sea retreats to a considerable distance from the shore at low tide.

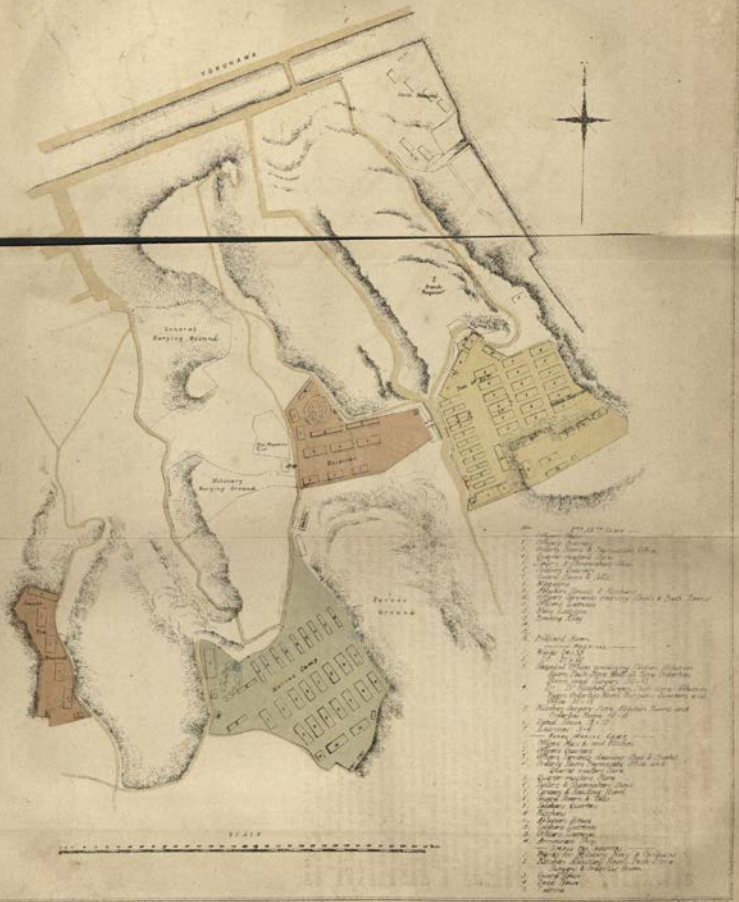
Yokohama is a town of considerable size, containing a population of 500 Europeans and 10,000 natives. The streets are wide, and cross each other generally at right angles. It is all timber-built, consisting entirely of shops, excepting the few houses and gardens at the end for foreigners. These shops are all filled with goods entirely selected to suit the wants and tastes of Europeans.

The native officials appear to entertain, in their intercourse with Europeans,

SKETCH

Showing Position of the Camps and other accommodation for the Troops

ON THE BLUFF NEAR YOKOHAMA, JAPAN.



the contemptuous depreciation of the mercantile class which prevails in the country, where traders and merchants, however prosperous and wealthy, occupy one of the lowest steps in the social scale.

Agriculture in the district is the chief occupation of the population. The land under cultivation is exceedingly fertile, a friable loam extending to a considerable depth, and easily worked. There is a great amount of waste marshy land, but this will be cleared very soon. Not another spot is uncultivated, nor any portion left in fallow. On the contrary, an unbroken expanse of abundant vegetation and verdure is to be seen throughout the year.

The troops are located on the bluff, close to but at a considerable elevation above the town, separated therefrom by the canal.

The barrack accommodation consists of wooden huts, recently built by the Japanese Government. The barrack huts and hospitals are constructed on precisely the same principles as those at Aldershot, admitting of the same cubic space, &c. &c.

A smallpox hospital, standing some distance from the barracks (separated therefrom by a ravine), has been recently built for the reception of smallpox cases occurring amongst the troops in garrison, the Fleet, and European civil population. The latter is separated from the naval and military portion by a high paling. A Staff Assistant-Surgeon attends the regular land forces, Marines, and Navy; and the Medical Officer attached to Her Britannic Majesty's Consulate has charge of the civilians.

I herewith enclose a sketch of the barracks and hospitals in garrison. I hope soon to be able to send a sketch of the whole concession.

There has been a very large sick list for the last twelve months, ending 31st December last. The admissions into regimental hospital during the above period (exclusive of the detachment at Stanley, of about 40 strong) has been 1,561. Number of cases of intermittent fever, for the same period, 118. Average strength during the twelve months has been 770. Total number of men not under medical treatment during the year, 173: therefore the admissions into hospital, as shown above, has been confined to 600 men, This I attribute to the effect of the bad climate of Kowloon. Intermittent fever, which is still very prevalent amongst the men of the 2nd Battalion 20th Regiment, is rarely seen among the other troops in garrison.

I enclose meteorological observations for the year 1864, published a few days ago by Dr. Hepburn, a medical missionary, who pays great attention to the subject. They may therefore be considered correct.

TABLE of Meteorological Observations for 1864, by J. C. Hepburn, M.D.

	Thermometer.								Fair Days.	Cloudy Days.	Rainy Days.	Snowy Days.	Inches of Rain.	Inches of Snow.	Earthquakes.	Direction of Wind.	Monthly Average of Therm.	
	7 A.M.		2 P.M.		9 P.M.		Max.	Min.										
	°	′	°	′	°	′	°	°									°	′
January	31	12	43	20	36	0	58	20	18	8	2	3	0·83	..	1	Northerly.	36	50
February	33	58	42	36	38	2	47	20	15	6	5	3	1·92	..	..	„	38	12
March	37	44	48	58	43	44	65	25	18	5	6	2	2·01	..	2	Variable.	43	28
April	53	47	61	50	57	12	71	40	13	5	12	..	9·37	..	..	„	57	36
May	59	36	69	11	63	27	77	50	18	4	9	..	4·10	..	2	Southerly.	64	04
June	67	06	73	26	67	12	81	51	14	5	11	..	9·11	..	3	„	69	14
July	72	21	81	9	76	58	89	70	16	9	6	..	4·48	..	1	„	76	49
August	76	38	83	42	79	25	89	70	19	3	9	..	5·71	..	..	„	79	55
September	69	33	75	0	67	40	86	59	11	4	15	..	17·83	..	1	Variable.	70	44
October	58	27	68	9	62	11	76	47	24	2	5	..	3·97	..	..	Northerly.	62	55
November	45	50	58	32	52	6	69	37	23	2	5	..	4·47	..	1	„	52	09
December	40	44	48	23	44	23	68	30	16	8	7	..	7·64	..	3	„	44	30
Average	53	54	62	54	57	21			205	61	92	8	71·44	..	14	..	58	62

First frost, November 26. First ice, December 14.

INDIA.

BENGAL.

Extract from the Annual Sanitary Report of 1864, prepared by Staff-Surgeon A. D. Home, C. B., in charge of the Arrears Branch, Inspector-General's Office, Calcutta.

During the year the circumstances exceptionally affecting the soldiers' healthiness have been few, and none of them have been of much moment, or have embraced many men within their influences. Slight epidemics of cholera have occurred at Lucknow, at Allahabad, at Dinapore, and at Benares, but the number of men attacked was only half that of last year. In every instance in which what seemed to be epidemic cholera appeared, the barracks in which it broke out were vacated, and the men were encamped either in the vicinity or at a greater distance. The happiest results followed this measure, the disease was arrested in all instances.

The cause of the outbreak in the 36th Regiment at Lucknow would seem to have been the bad sanitary site of two bungalows in which part of the regiment was quartered. The ground is stated to have been used for burials, and near the bungalows ground had been turned up for gardens before the outbreak. The disease was confined to the men in those bungalows. No satisfactory explanation is given with respect to causes to which it was probably due at most of the other stations.

Smallpox attacked eighty men last year, although vaccination has been kept up with great strictness. Meerut, Lucknow, Jhansi, Agra, and Mattra were the places where most cases occurred, and no doubt the infection was communicated from natives in the bazaars. It is mentioned in several reports that smallpox was very prevalent in the neighbourhood or at the station, but that the troops escaped.

In 1864, nearly all the reports make reference to the very exceptional heat of the summer; and this no doubt influenced the number of cases of sun-stroke and apoplexy.

The cyclone at Calcutta and its vicinity destroyed part of the Barrackpore Barracks, but did not cause any serious permanent inconvenience.

Field operations have been during the year carried on in Bhootan, but the number of casualties was, comparatively speaking, small. To some extent an increase of invaliding was due to this cause.

On the whole, the year has been a very healthy one; or, it may perhaps be permitted to say, that the sanitary improvements of late years are now bearing their fruit in diminished sickness, and lessened mortality following sickness, in the army.

As a rule the newly-arrived regiments have been the most unhealthy. The 36th Regiment, at Lucknow, has had during the year a death-rate of 77·82 per 1,000 of the strength; and the 5th Lancers, at the same place, a death-rate of 41·53 per 1,000. Contrasted with these corps, the 21st Hussars, at Umballa, have had a death-rate of only 5·32 per 1,000, and the 3rd Battalion Rifle Brigade, at Peshawur, a mortality of only 10·29 per 1,000.

Barracks.—During the year it appears from the various reports that the men have generally had a large amount of barrack space; but in some instances this has fallen below the amount of 1,200 cubic feet per man. These were at Peshawur, where the 3rd Battalion Rifle Brigade had only, for the whole year, an average of 1,022 cubic feet per man; and at Senchall, where a detachment of the 80th Regiment had only an average cubical space of 797 feet per man.

At some stations, during the hot weather, a practice prevailed of pitching tents to supplement the barrack-accommodation. These were used at night only as sleeping-places. The plan is well spoken of, as one conducive both to healthiness and comfort.

In the matter of ventilation of barracks, at Agra, in those occupied by the 1st Battalion 23rd Regiment, the plan first introduced by Dr. Stewart Clarke, of renewing the air by thermantidotes specially managed, was carried out with excellent results.

It is gathered from the various reports that there is still much need of proper ventilation in many barracks; but the difficulties connected with this subject are so great that, whilst noticing the need, hardly any suggestions are given as to how to effect the desired result.

Very numerous complaints are made of the want of fire-places in many barracks, chiefly in the Rohilcund and Meerut Divisions.

At many stations, during the rains, or in very cold weather, it has been the practice to allow charcoal fires in braziers during the day, thus, to a beneficial extent, drying the damp air, and allowing wet clothes to dry also; but at other stations, where the need was equally urgent, this practice was not put in use. The practice seems to obtain only at those stations where the Deputy Inspector General of the circle recommends it. At Bareilly, though the charcoal-warmers were strongly recommended by the Surgeon of the 104th Regiment, and by the Commanding Officer, it was objected to, apparently on account of the expense.

In the Punjaub, the allowance of fire-wood (40 lbs. per diem), seems at some places hardly enough. One surgeon at Ferozepore makes the remark, that the barracks are warm enough when the doors and windows are closed at night,—an arrangement the reverse of wholesome.

The practice which still obtains in many places in Cavalry and Artillery corps, of keeping the saddles in the men's rooms, is reported to be very objectionable.

The quarters for married soldiers are, in some reports, said to be very bad.

Latrines and Ashpits.—The great sanitary feature of the year has been the general introduction of the dry conservancy system into all barracks. The result has been spoken of in every report as a most complete success. The only suggestions made are that store-houses should be provided for the dry earth.

The surgeon of 52nd Regiment, in Fort William, reports that there was difficulty in getting the dry earth.

At Saugor, it is reported by the Surgeon of the 97th Regiment, and by the Medical Officer of the Battery of Artillery, that the cesspits, though 700 yards from the nearest barrack, smelt very offensively, and were, on representation, closed up. But it is suspected that the unwholesome emanations from these induced the cholera, of which disease there were a few cases at Saugor. It seems clear that a much greater distance from barracks is desirable for the locality selected for cesspits.

Ablution.—There is a very general concurrence of opinion amongst the Medical Officers, as shown in their reports, as to the insufficiency of the ablution accommodation in one or more points. Either the basins are said to be too few in number, as in the 4th Brigade 24th Battery Royal Artillery, at Meerut, where the Medical Officer reports that, owing to the scarcity of basins, the men had to use the water-troughs; or water was not obtainable, owing to the insufficient number of water-carriers. Often the ablution-building is said to be too small or ill-fitted. At Umballa, in the cavalry barracks there, the surgeon reports that the ablution-building is so cold and comfortless in winter that the men shirk washing.*

Swimming baths have been supplied at several stations during the year.

In the matter of supply of basins, it would seem that there is no unvarying rule about the number issued; for, while some corps complain of the insufficiency of the number, others, as the 2nd Dragoon Guards and the 2nd Battalion 12th Regiment, are reported as having a basin for every man.

Cooking.—During the year, the arrangement commenced in 1863, of having an orderly cook man to superintend the kitchens, has been carried out.† Most

* All the ablution-rooms at Umballah are now very good, as will be seen from my inspection of the barracks there only three months ago.—G. I. BEATSON, Inspector-General, 16th May, 1866.

† Inspector-General Beatson observes:—"The late Commander-in-Chief issued an order to this effect, but it cannot be carried out. The present kitchens are so objectionable that no British soldier could remain in them in the hot weather."

of the reports are silent on this subject; but in one or two it is stated that the badly-ventilated, smoky cook-rooms injure the health of the Europeans employed there. Facilities for roasting or baking meat are spoken of as desirable in some reports. The system of leaving messes to have their food cooked according to their fancies, is alluded to in nearly all the reports as one very advantageous.

Water Supply.—The remarks under this head are few and do not call for reproduction. At Delhi, the practice of boiling the river-water previous to drinking is carried out, with a view to prevent an assumed cause of the ulcers called "Delhi sores."

Rations.—The important subject of the dieting of the soldier in India is one which naturally has prominent notice in the regimental reports.

The scale of rations now in use is generally allowed to be sufficient. Some Medical Officers wish to see a readjustment,* however, so as to give less meat in the hot season and more vegetables. Others, arguing from the fact of the soldier's spending part of his surplus pay in additional food, doubt the fact of his being even sufficiently fed. And all Medical Officers seem to think that much improvement may be made in the quality of the meat. Stall-feeding is recommended for the season when grass is scanty. Several Medical Officers suggest that a salt ration should be issued once a-week as a beneficial change.

Vegetables, at some stations, are difficult to procure, and potatoes, in the wet season, are often bad. Soldiers' gardens would probably be the best means of supplying vegetables; but the insecurity of tenure of these makes their productiveness not so great as might be.

At Mooltan, owing to the great want of vegetables and the anticipated appearance of scurvy, a special ration was issued of preserved potatoes, turnips, and carrots; and lime-juice was also given to the men with good effect.

It is proposed by the Surgeon of the 52nd Regiment that the hours at which the meals are served should be altered, so as to distribute the time more fairly over the day. Dinner he proposes to serve at 2.30 P.M.†

In speaking of the number of men affected with tape-worm, the Surgeon of the 104th Regiment adverts to the necessity of guarding against the sale of measly pork in the bazaars. It is difficult to see how this can be contrived without the absolute interdiction of the sale of pork at all.

Clothing.—Under this head the remarks made by the various Medical Officers are identical in fact, and very much so in expression. The clothing is said to be excellent. The surgeon of a Cavalry regiment advocates the issue to such corps of a serge tunic similar to that worn by Infantry soldiers at certain seasons. From the report of the Surgeon of the 7th Hussars, it would appear that that regiment has already received such a dress, and that it is very highly approved of.

The compulsory wearing of flannel shirts is insisted on by the surgeon of the 88th Regiment as likely to be very beneficial. He limits his suggestion to the period of the rainy season; but probably the good effect would be better seen if worn always, as is the case already in many regiments.

Occupations and Amusements.—The means of amusement at the soldier's disposal are very varied, including, at many stations, gymnasiums. Theatricals seem to be the most esteemed sources of entertainment. In the D Brigade 11th Battery of Royal Horse Artillery it seems that the men (Bareilly station) are allowed to go out coursing and shooting, a relaxation of ordinary rules which they enjoy very much.

During the year working-parties of men of certain regiments were employed near Murree, and the effect of this employment on their health is said to have been good.

Canteens.—In 1864, the Commander-in-Chief's order, directing the issue of only half the previous allowance of rum to soldiers came into force. The reports do not speak prominently of its effect on the sobriety of the soldiers.

* Inspector-General Beatson observes:—"This readjustment is now allowed when recommended by the Commanding Officer and Medical Officer, and when no extra expense is incurred."

† Inspector-General Beatson observes:—"This has been sanctioned on the recommendation of a Committee of which I was President in September or October 1864."

Bedding.—The great plague of insects (bugs chiefly) has been tried to be met by the erection, at stations, of what are termed "bug-boilers." The effect of these on the wooden cots is to weaken the joints, and the good produced is found to be very temporary. Iron cots, or cots with hoop bottoms, are spoken of as likely to be useful in harbouring insects less.

Cells and Guard Rooms.—During the year a good many representations on the subject of cells and places of confinement have been made. Some cells have metal roofs, and are too hot; some are very cold in winter, from want of proper provision for closing up to some extent the openings necessary during the hot season. Some reports recommend punkahs for certain cells.

At Umritsur station, the cells in Fort Govindghur were so unhealthy during part of the year, that all the men in them contracted illness. On the representation of the Medical Officer, the prisoners were transferred to Meean Meer. Similarly, at Umballah, the cells there being reported by the Medical Officer to be injurious to the prisoners' health, the long-term prisoners were transferred to a hill-station.

Hospitals.—In general the reports concerning hospitals show that the patients had in them ample space. An exception to this occurs in the hospital occupied by the E Brigade 22nd Battery Royal Artillery, at Morar, which is said to be a miserable mud building, deficient in ventilation.

The proper adjuncts to a hospital are not well spoken of. Ablution accommodation is often represented as scanty, and bad of its kind in one report. The clothing is said to be inferior and the blankets not sufficient. Great difficulty is experienced in procuring good hospital-cooks from the low wages paid (which is lower than the amount earned by the barrack-cooks). Indeed, the hospital cooking is anything but good.

The above remarks give a summary of the expressions of opinion of Medical Officers in charge of regiments and corps in 1864, relative to the matters spoken of. From a few corps it has not been possible to get sanitary reports in sufficient time to include with the present. When received, a supplementary report shall be sent in containing them.

EXTRACT FROM THE ANNUAL SANITARY REPORT FOR 1864 OF THE MADRAS PRESIDENCY.

By Deputy Inspector-General Dr. Inglis, C.B.

The following retrospect epitomized from the Monthly Reports will explain the most important medical occurrences for the year, with such special deviations from health as merit remark.

First Quarter.

January.—Eight deaths from cholera, four of which occurred in C Battery, 14th Brigade, Royal Artillery, *en route* from Secunderabad to Kamptee, attributed to camp-followers communicating with infected villages. Three deaths also occurred in 2nd Battalion 19th Regiment, on River Sitang, *en route* to Tonghoo. The other was a sporadic case.

February.—Cholera broke out in the camp of the 74th Highlanders at Guindy, near Madras, carrying off eight men in two days,—progress of the epidemic was arrested immediately by moving the regiment to Palaveram. Outbreak attributed to local causes existing in first-named encampment.

March.—Only one case of sporadic cholera occurred.

Second Quarter.

April.—Cholera broke out in a detachment proceeding from Kamptee to the Sanatorium of Chindwarrah, by which nine deaths occurred. At Bellary, by the blowing up of an Artillery tumbril, four gunners lost their lives, so that mortality during the month in question was chiefly from exceptional and unforeseen causes.

May.—Three more casualties occurred at Kamptee from cholera, and a few fatal cases of insolatio in British Burmah. A mild type of conjunctival inflammation, dependent on local causes, appeared in the 2nd Battalion 21st Fusiliers at Bellary, affecting the children chiefly at first.

June.—No death by cholera throughout the Command, notwithstanding which mortality was high by elevated temperature causing sunstroke, with miasmatic influences developing fevers and other zymotic complaints. Mild ophthalmia still prevalent in 2nd Battalion 21st Regiment at Bellary.

THIRD QUARTER.

July.—Exempt from cholera, but mortality still rather high from same influences existing as during last month. Conjunctival ophthalmia gradually diminishing in 2nd Battalion 21st Foot. Dracunculus appeared in the 1st Battalion 18th Foot at Trimulgherry, originating probably in the water supply of the regiment. Suspected wells were closed up, and scrupulous attention paid to the supply.

August.—One death by a sporadic attack of cholera reported. By comparison, however, with two preceding months, health-returns are favourable, and mortality moderate.

September.—Two cases of cholera occurred in the 18th Royal Irish, and a third in Burmah in a sporadic form. Guinea-worm still prevalent in the 18th at Trimulgherry.

FOURTH QUARTER.

October.—Health of the troops throughout the Command very satisfactory. Dracunculus diminishing in the 1st Battalion 18th Royal Irish at Trimulgherry. It is worthy of record that none of the other troops at the station, though in contiguous proximity to this regiment, suffers from Guinea-worm, favouring the hypothesis that the period of incubation of the parasite in the 18th Regiment is of date somewhat remote, and probably not of local origin.

November.—Sanitary condition of troops good—neither cholera or other special form of disease disturbing the balance of health and sickness. Dracunculus in 18th Regiment disappearing.

December.—Was also distinguished by absence of cholera or any other special disease, and although mortality was slightly in excess of preceding months, still not so to an extraordinary degree. Of Guinea-worm from occurrence of the disease, 23rd July, to the 12th of this month ninety-three cases were admitted. The disease has now nearly disappeared.

With regard to the second paragraph of printed instructions, by which I am to state such leading sanitary improvements as may have been effected in the course of the year, it is reasonable to infer from a reference to the numerous orders of Government and public money sanctioned, that considerable progress has been made in that direction. Still much remains to be done towards supplying existing deficiency connected with drainage, water-supply, and ventilation of barracks, ablutionary and bathing accommodation, &c. The dry earth system of conservancy is being gradually introduced in the several barracks and hospitals throughout the Command, and is said to be the best known method of deodorizing fæcal deposits yet discovered in India; but as the latrines are generally unadapted for the special carrying out of the system, except at certain stations, Kamptee and Madras for instance, it may be as well to reserve remark till by further trial its efficacy is fully established.

The President of the Madras Sanitary Commission about the close of the year submitted the result of a series of experiments chiefly conducted at the General European Hospital, Madras, which enabled him to report very favourably on the value of dry earth as a deodorizer; but among the material points essential to success, he mentions that, in future, latrines on a standard plan should be constructed suitable for the system. In general much care is exercised in latrine arrangements of barracks and hospitals, and where faults exist they refer in greater degree to bad construction of the latrines themselves, and the utensils with which they are furnished, than to the efforts made for maintaining them in a proper cleanly and sanitary condition.

Much variety exists in means at disposal for bathing and ablutionary pur-

poses throughout the Command. At Kamptee, during my inspection of the barracks and hospitals of that station, I was much struck by the comparative excellence of what I observed in that respect. Bathing as well as the latrine arrangements being greatly in advance of what exists at other stations. I may instance Bangalore as failing in this respect, neither the water-supply, the accommodation afforded by subsidiary buildings, nor the number of utensils for ablutions being adequate. A standard plan for wash-houses and plunge-baths should be adopted for every station, and means afforded for private ablutions, a desideratum much wanted to diminish the risk of infection by venereal ailments. The floors of wash-houses should be of granite, which is easily obtainable owing to the geological formation of the country at Bangalore, Bellary, and Secunderabad; the joinings should be filled up by hydraulic cement to prevent the effects of infiltration and soakage. In this last respect, the bathing-rooms of the Cavalry Barracks at Bangalore are deficient, they are flagged with stone, but being badly joined much of the refuse water escapes into the soil below. Estimates for improving the wash-houses of the hospital at St. Thomas Mount, with other works also for improving the main drain from the South Barracks of the same station, received the approval of Government. At Bellary several useful works likely to improve the sanitary conditions of barracks have and are being carried into effect, including a library, reading-room, coffee-room, and recreation-room, for the European Infantry. The system of drainage in the Infantry lines demands attention. The defective water-supply, chiefly owing to local physical conditions and the scanty rain-fall throughout the year, at this station is severely felt, and any artificial remedy for this great objection to Bellary as a military station would be a blessing. The introduction of water from the Tumbudra river is a scheme well worthy the attention of the Irrigation Company and Government. A pure supply of water is also much wanted at Madras, as it appears this essential element of health at the Presidency has become greatly contaminated from percolation, chemical analysis having discovered that it is loaded with organic impurities. The supply is from the "Seven Wells," formerly regarded as comparatively pure. This state of the water has attracted the attention of Government, and a Committee of Inquiry is now investigating the subject. Means are also in progress for improving the water-supply both in quality and quantity at Bangalore. At Kamptee considerable improvements in drainage of barracks and their environs are being effected, and the works sanctioned, viz., the building of new family quarters, and the removal of old ranges which prevent perflation in barracks will materially tend to ameliorate their sanitary condition. I regret to have to remark on the slow progress made towards the completion of the blocks of barracks for the regiment of Cavalry and troops of Artillery on the old race-course at Bangalore. I would bring to notice especially that nothing has been done towards the construction of the hospital sanctioned for the troops to be stationed there. In 1863 a plan was prepared for the erection of such a building, the necessity for rapid execution of which was indicated by the well-known insufficiency of the existing hospital-accommodation at that station, so often represented that I need not extend the limits of a report, which must necessarily be condensed, by more than passing allusion to such a necessity.

At Madras considerable progress has been made towards the completion of the scheme for enlarging, improving, and embellishing the Great General Hospital, the composition of whose inmates, civil and military, is so ill-assorted and incongruous. The Infantry regiment in Fort St. George has ample accommodation at present in the western upper story, and is destined on completion of the corresponding eastern wing, which offers a better exposure to the sea-breeze, to occupy that portion of the building. While admitting that the troops are, as regards superficial and cubic space, amply accommodated in this palatial structure, I still, however, adhere to an opinion I formerly entertained, viz., that neither as regards position, means of maintaining discipline, nor segregation of the military from the heterogenous assemblage of patients composing the inmates of this vast infirmary, is it suitable for the purposes of a regimental hospital. It is evidently an anomaly that a portion of a large civil hospital should be set apart for military purposes, and the only hope I entertain is, that as the increasing want of the poorer European

and Eurasian population of the Presidency may demand all the space now available, and in progress of completion, a suitable regimental hospital on a better site, and more convenient with reference to Fort St. George, may yet be sanctioned. When I mention that the area in which this vast pile is enclosed contains also a temporary building for the treatment of native sick, and that a school connected with the Madras Medical College is also within its enclosure, which, taken together with the unharmonious assemblage, viz., sailors and others, forming the civil element of occupation in the main structure, I think it must be conceded that even under the most zealous supervision, breaches in hospital discipline, tending to influence in an undersirable degree the treatment of the military sick, may occur more frequently than would be the case under other circumstances. I need not also point out a chief intent of all modern sanitation (lost sight of here), viz., avoidance of congregation of numerous sick under the same building; for which reason I should, at all events, like to see the military constituents of this hospital separately accommodated. I may mention also that in the allotment of wards to the regiment, space is set apart for the treatment of invalids, viz., single men transferred from other stations for change to the neighbourhood of the sea. The want of suitable accommodation for the treatment and comfort of the sick women and children is much felt. It is provided in a building supplemented for the purpose in the compound, and is deficient in privacy for special or obstetric cases, in ventilation, and in latrine, as well as ablutionary means. This may be regarded, however, as of a temporary nature; but no time should be lost in transferring this class of patients to rooms better adapted for hospital purposes. The cook-rooms and guard-room are dark and badly-ventilated, and not in unison with the architectural grandeur of the main structure; no doubt, however, it is intended other subsidiary buildings more in accordance with the pretensions of so imposing a public edifice will yet be constructed. With regard to facilities for cooking, as a rule, the same means are in use as were noted in the corresponding report of last year, viz., by native agencies. Patent ranges have not yet been universally adopted, and the remarks I made in my last year's report on the subject of kitchens, &c., as well as the quality, quantity, and mode of preparation of the soldier's ration, apply very much to the present.

In reference to bedding, matters are pretty much at a stand still, and it is to be hoped the improvements which have been already recommended by the military sanitary and medical authorities, will not be long deferred. Coir mattresses are in use throughout the hospitals, and the substitution is greatly appreciated. As I entered fully on this subject of report last year, I need scarcely again repeat my remarks, and shall only reiterate my hope that changes for the better in the barrack-room bedding are also soon to be carried into effect.

With reference to the means for maintaining and improving the moral and physical welfare of the soldier in India, I would refer to the remarks I made in my last Sanitary Report generally; and, for the latter desideratum, I would again advert to the importance of gymnasia, and for reasons so well understood and so frequently advocated, trust their introduction at all large stations in the Command, Secunderabad and Bangalore particularly, may be accelerated as much as possible. While on the subject of lavatories, I should also have urged the absolute need of plunge-baths, both for the recreation of swimming (an essential element in a soldier's training) and the very important one of cleanliness, and which no barrack in India should be without. Bathing-parades are insisted upon by military medical regulation, but at many stations they cannot be carried out for want of means, and without which there is no guarantee that the daily immersion of every man's person takes place. In India personal cleanliness is an impossibility without scrupulous daily submersion of the whole body, which I know soldiers as a rule freely practise when they can; but how can this adjunct to health and efficiency be obtained by the general scanty means at disposal? At Bangalore, for instance, bathing in the tanks is prohibited as tending to the polution of the water (in those great reservoirs), which is so valuable for economical purposes, and the risk to life by browning owing to their special unadaptability for bathing purposes. At stations on the coast, enclosed spaces might be easily constructed to render

sea-bathing safe, otherwise commanding officers are averse to exposing their men to sharks and other dangers attending intertropical sea-bathing.

With reference to clothing, no changes of any importance have taken place since I reported on the same subject last year.

Having now remarked on the leading sanitary changes which have been carried out during the period embraced by this return, and offered the comments and suggestions I am invited to do, for further improving the efficiency and sanitary well-being of the troops under my medical superintendence, I shall close this section, reserving for future report the result of my observations.

SPECIAL CONTRIBUTIONS.

REPORT OF THE CHOLERA EPIDEMIC OF 1865 IN THE MALTESE ISLANDS;

TOGETHER WITH AN INTRODUCTION AND AN EPITOME OF THE CHOLERA EPIDEMICS THAT HAVE PREVIOUSLY RAVAGED THEM.

By Surgeon A. Leith Adams, 1st Battalion 22nd Regiment; and Assistant-Surgeon F. H. Welch, 1st Battalion 22nd Regiment.

Introduction.

When the geological structure and physical aspects of the Maltese Islands are carefully studied, they present a remarkable absence of all natural conditions calculated to produce or foster zymotic disease. The lithological structure consists of a durable limestone, overlaid by sandstone, marl, sand, and coralliferous limestone, the successive bottoms of a Miocene sea; and upheaved at a subsequent period, when they formed a large tract of country, probably connected with Africa, Europe, or both. The whole of this land was again submerged and re-elevated, when subsequently it sank beneath the waves, leaving only the few small fragments now known as Malta, Gozo, Comino, and Filfla. The bare and rugged appearances of the islands are owing almost entirely to these disturbances, and the tear and wear of the sea and elements, during and after the successive upheavals and depressions. This therefore explains the scantiness of the alluvial deposits, for excepting in valleys and hollows, the superficial soil may be said to be inconsiderable everywhere.

Again, there are no marshes, lakes, or even a perennial stream. The only source of water is by the rainfall percolating the upper soft beds, and being obtained on the marl, or collected on the suaface in artificial reservoirs. It is recorded that certain valleys, to wit, St. Paul's and the Great Marsa, were for a long time productive of remittent and intermittent fevers, which appear to have been owing to the dank and marshy condition of the lower parts near the sea, for when properly drained these fevers disappeared entirely. This is the only account of marsh miasm we can discover in connection with these islands, and the immunity enjoyed by the inhabitants from the above-named fevers for at least thirty-five years shows that the influence has disappeared.

The high temperature of the summer is peculiarly favourable to the growth and propagation of such diseases as cholera. Accordingly, as will be noted in the sequel, every epidemic, although displaying a doubtful existence at the beginning, burst into unmistakeable proportions on any marked and persistent rise of temperature, and disappeared about the beginning of November. With the exception of this high temperature during the summer months, there are no other natural conditions capable of exercising a deleterious influence on the public health; but when the social and sanitary states of the inhabitants are studied, there is no difficulty in perceiving that the grand defects in the position

and construction of dwellings, bad drainage, overcrowding, and natural indifference to cleanliness, constitute the main, if not the sole, favouring causes of the spread of zymotic disease, and which is only counteracted in any degree by the natural hardy constitutions of the natives, and general absence of vicious propensities.

Taking also into consideration the geographical position of the Maltese group, it might be expected that at such a distance from Africa and Europe they would be far less subject to epidemic visitations than islands situate in the immediate vicinity of continents; but unfortunately such has not been the case, for, as will be shown, there has scarcely been an epidemic of cholera in the eastern basin of the Mediterranean, or in the beaten path of commerce, that has not sooner or later found its way to Malta, whilst many other lands nearer to the infected parts have escaped.

It is clear from the history of cholera that such skipping over intermediate countries, such intercalation and isolation of the disease as have been so often illustrated in Malta and elsewhere, must be owing to some other mode of propagation than mere meteorological conditions and "epidemic constitutions." The influence of certain unknown states of the atmosphere is highly probable, but that such alone is sufficient to explain all the phenomena with reference to the origin and progress of cholera may be fairly doubted. There is a clear mass of evidence, chiefly the accumulation of late years, showing that the disease is communicable by intercourse with the affected, and so precise and incontrovertible as to leave no doubt of the capability of its propagation in this way, independently of all atmospheric conditions whatever. Indeed it may be questioned if the disease ever found its entrance into Malta by any other means.

Epitome of Previous Epidemics.

In tracing the early history of cholera in the Maltese Islands, it appears that the mild form of the disease has existed among the inhabitants from time immemorial, and was not unfrequent among the British force up to the date of the first epidemic of spasmodic cholera in 1837. It differed from the latter only in the mildness of the symptoms, but now and then sporadic cases occurred, similar to spasmodic cholera both in virulence and fatality. Such cases were usually attributed to exposure during the heat of summer, and errors and excesses in diet.

From 1818 to 1836, the admissions among the military from cholera morbus only amounted to 1·1 per cent of strength, and ·001 per cent. death rate; while among the civil population, in ten years ending 1831, only two deaths from this disease are recorded.*

Cholera Epidemic of 1837.—The first and hitherto most fatal invasion of the disease occurred in the summer and autumn of 1837. The meteorological conditions of that, compared with previous years, "were in no way peculiar." It is stated that there was a "marked uniformity" both in the weight and temperature of the air, and also the winds. Dr. Chetcuti, a careful and accurate observer, noted that "sporadic cases of cholera were unusually common during the last quarter of 1836 and beginning of the following year, and were exceedingly fatal. Influenza also prevailed to an unusual extent."† Before, and during the outbreak in Malta, the disease raged in Sicily, and vessels therefrom were placed in quarantine for ten days. As the disease, in its virulent and epidemic form, was perfectly unknown to the faculty, excepting one or two Army Medical Officers serving in the garrison, it is possible that the earliest cases may have been overlooked or misrepresented; nevertheless we find that the crews of certain vessels from Sicily had the disease on board early in June while in quarantine. "For three days preceding the first attacks among the populace, the thermometer in the shade rose from 72° to 78°, with a depressing south wind."‡ The garrison, composed of four regiments of the Line, Royal Artillery, and Malta Regiment, did not exceed an average strength of 3,670. On the 9th June the first two cases appeared among the inmates of the "Ospizio di Vecchi," a low-roofed building of the most wretched construc-

* Davy, Army Diseases, p. 111.
† Cenni istorici del Colera di 1837, Dr. Chetcuti.
‡ Dr. Chetcuti.

tion, badly drained, ill ventilated, and crowded with aged and, for the most part, bedridden paupers; a regular "bear-pit," shut out from every breath of heaven, and of all others the most likely, even now, to afford a nestling-place for cholera. It is situated in one of the ditches close to and directly below the Florian Barracks,* which were then occupied by the 92nd Highlanders. The disease next appeared in this corps on the 17th, and on the 19th smote the Royal Artillery at Upper St. Elmo, running around the quarantine harbour and along the valley from Misida to Birchircara. In little more than a fortnight every village within five miles of Valletta was struck by the disease, which gradually extended itself to the more distant and elevated positions, and finally reached Casal Dingli, 700 feet above the level of the sea, and the highest point in the island, on the 29th August. As usual with all the epidemics of plague, small-pox, and such like, the poorer classes suffered most; and, besides Valletta, the towns of Zabbar, Birchircara, and Curmi produced the highest death rate, in consequence of the great crowding and unhealthy conditions that to this day characterise these casals, which in point of fact are but suburbs of the capital.

As soon as the disease was fairly established, many of the inhabitants of Malta fled to Gozo. Twenty-seven days elapsed from the first appearance of the outbreak before a case was recorded there. "One of its villages, for a long time exempt, and situated on an airy, elevated, and isolated position, was struck in one night, and upwards of forty persons were attacked." †

The prevalence of cases among the 92nd caused their removal to Fort Manoel, but without stopping the disease. The mortality among the women and children of certain corps "was almost entirely confined to such as were not on the strength, living in lodgings and without rations." ‡

The disease culminated about the middle of July, and disappeared early in October. It was observed that a prevalence of cool northerly winds did not decrease the sickness, nor did the southerly or sirocco increase it. Among all classes the disease maintained its virulence to the last; and instances are quoted of persons having had "two attacks, and also of recoveries after the patient had been pulseless." § Several attendants in cholera wards, nurses, and washerwomen, contracted the disease; but these were considered to be susceptible from overwork and other personal causes, and in nowise exemplifying contagion, which was scouted by the Government officers, and had but few partisans.

In Malta there were 7,981 attacks, and 3,893 deaths; in Gozo, 804 attacks, and 359 deaths. Out of an average strength of 3,070, the garrison furnished 315 cases, and 78 deaths. The average duration of fatal cases was 12½ hours.

For the period of twelve years after the above outbreak, Malta enjoyed a freedom from epidemic cholera. Cases of the milder form occurred from time to time, especially during 1838, 1840, and 1845. Dysentery and diarrhœa also showed a marked prevalence in certain years, and in particular in 1841, when the total admissions into the military hospitals, for the latter disease, exceeded considerably those of 1837 (*vide* Table I). This is very apparent when compared with 1843 and the three succeeding years, during which the troops showed a marked immunity from bowel complaints of every description.

Epidemic of 1848.—The year preceding this somewhat strange and suggestive outbreak of spasmodic cholera among the military was remarkable for the unusual number of choleraic cases during the summer months. As many as 19 admissions and 1 death took place, this latter presenting all the characteristics of the spasmodic form. Among the civil population the diarrhœa did not prevail; the returns show an average health-rate and remarkable immunity from bowel complaints.

The autumnal months of 1848, when compared with those of 1847, were characterised by high temperature, an equable barometer, half the quantity of rainfall, and southerly winds. The preceding spring and summer were very

* This barrack was decimated by the plague of 1813, which disappeared on the removal of the infected troops to Fort Ricasoli. Its subsequent history up to the present time details one long repetition of evils of a similar nature.

† Annual Report by Dr. Clark, Principal Medical Officer.

‡ *Ibid.*

§ Dr. Palmer, 92nd Highlanders.

dry, and so hot that "many men fainted on parade from the intense heat." In August Asiatic cholera made its appearance in Egypt, at a place called Tantah, where 165,000 pilgrims were assembled to celebrate the festival of a Mahomedan saint. 3,000 died before their dispersal; and immediately following, the disease appeared in Cairo and Alexandria,* and subsequently in Turkey and surrounding countries, in consequence of which a quarantine was established at Malta on all vessels from infected ports.

The latter part of September was ushered in by several very heavy falls of rain, when, shortly afterwards, "the tanks supplying Lower St. Elmo Barracks were found choked up with decomposing vegetable matter, and filled with animalculæ; the drainage was very bad, privies offensive, and men crowded."†

The Royal Artillery in Upper St. Elmo participated in like sanitary defects. At this time "fevers and bowel-complaints became suddenly and greatly augmented among the troops stationed in these two barracks."‡ At length, on the 22nd September, the first case of genuine Asiatic cholera occurred in the 69th Regiment, stationed at Lower St. Elmo, followed rapidly by several others, and accompanied by an increase of diarrhœa. It was especially noted that the major number of cases were admitted "from the rooms in the immediate vicinity of the common drain and men's privy; and that, moreover, on previous occasions, these identical rooms had been frequently temporarily abandoned, on account of the great amount of sickness they had produced in comparison with others in the same barrack."§ (It may be remarked that, as far back as 1834, two of the central rooms produced a marked number of cases of remittent fevers and bowel complaints, which were ascribed to "the exceedingly damp floors, all but level with the sea, and to a foul drain in the vicinity." And even as late as 1859, "the typhoid fever then prevalent in the 23rd Regiment was stated to be owing to the defective drainage."‖)

The cholera having become localized, the 69th Regiment was removed to Floriana on the 10th October, which put a stop to the disease, as only three cases occurred afterwards, and these on the day subsequent to their removal. Upper St. Elmo having suffered at the same time, and in a like severity, the Royal Artillery were removed to a corn-store within 100 yards of the fort, with the same beneficial result, not a case afterwards occurring.

As soon as Lower St. Elmo was abandoned, the rooms were fumigated and whitewashed, when the reserve battalion of the 69th was brought from the Cottonera lines, and occupied all, with the exception of the infected rooms. Additional space to each man was also allowed; nevertheless alarm spread among them, followed by several fatal cases. As usual, fear and drunkenness prevailed. The latter characterised almost every case, and the General Officer in command of the troops made their reckless conduct the subject of a general order.

The only barracks affected were Upper and Lower St. Elmo, and the only corps were the two battalions of the 69th and the Royal Artillery. The number of the attacks amounted to 28, with 21 deaths; but the Principal Medical Officer remarks "that 639 cases of diarrhœa were admitted into hospital, of whom 20 died," many of the latter presenting all the symptoms of cholera, and proving fatal within a few hours after admission.

There seems to have been much difference of opinion with reference to its presence among the civil population. Five cases are recorded in the returns of the Civil Hospital during the last quarter of the year, and only six deaths from diarrhœa in a population of 123,000. By many competent authorities (the Principal Medical Officer included) the presence of the disease among the natives was positively denied. They stated that these cases were merely ordinary bilious cholera, and received from the country districts.

Whether we place the cause of this curious outbreak to the local defects alone, or to these combined with a general "atmospheric epidemic influence," the lesson to be deduced remains the same, viz., that to the unhygienic conditions under which these battalions existed, the disease owed its virulence and localization, if not its origin.

* Medical Times and Gazette, October 14, 1865.
† Report by Dr. Barry for 1848. ‡ *Ibid.*
§ Dr. Barry's Report for 1848. ‖ Army Sanitary Report for 1859.

TABLE I. Showing the Admissions and Deaths from Cholera and Diarrhœa in the Garrison of Malta, from 1837 to 1864 inclusive, as well as the Percentage of Attacks of each to Strength, and Deaths to Attacks.

Year.	Average Strength.	Admissions.		Deaths.		Percentage of Attacks to Strength.		Percentage of Deaths to Attacks.	
		Cholera.	Diarrhœa.	Cholera.	Diarrhœa.	Cholera.	Diarrhœa.	Cholera.	Diarrhœa.
1838*	2,236	209	406	45	1	9·03	18·1	21·5	·24
1839	2,186	15	224	..	1	·68	10·2	..	·44
1840	2,121	21	128	..	2	·99	6·	..	1·56
1841	2,702	7	337	..	2	·25	12·4	..	·59
1842	3,172	..	495	..	4	..	15·6	..	·8
1843	2,719	..	265	..	..	..	9·7	..	..
1844	2,504	..	166	..	3	..	6·6	..	1·8
1845	2,440	..	115	..	2	..	4·7	..	1·73
1846	2,425	5	88	..	..	·02	3·6	..	..
1847	2,574	1	133	..	..	·03	5·1	..	..
1848	2,534	19	190	1	1	·74	7·49	5·2	·52
1849*	3,054	28	657	21	19	·91	21·5	75·	2·8
1850	3,171	2	279	1	5	·06	8·7	50·	1·7
1851*	2,917	188	409	108	1	6·04	14·	57·4	·24
1852	3,196	3	272	..	..	·09	8·5	..	..
1853	3,157*	..	194	..	2	..	6·1	..	1·03
1854	{3,803	..	212	..	..	..	5·5	..	..
	{9,929†	..	11	..	..	..	·11	..	..
1855	{3,218	36	496	18	2	1·11	15·4	50·	·4
	{ 881†	65	391	18	16	7·03	44·4	27·7	4·09
1856	{1,741	16	238	13	..	·91	13·6	81·2	..
	{5,792†	53	152	43	14	·91	2·6	81·1	9·2
1857	7,239	69	54	36	1	·95	·74	52·1	1·8
1858	6,160	2	241	..	1	·03	3·09	..	·41
1859	4,899	2	638	..	4	·04	13·	..	·62
1860	6,558	2	591	1	5	·03	9·01	50·	·84
1861	6,790	1	192	..	..	·01	2·8	..	..
1862	6,565	1	247	..	..	·01	3·7	..	..
1863	6,351	..	195	..	1	..	3·06	..	·51
1864	6,221	1	259	..	1	·01	4·1	..	·38

NOTE.—Up to 1859 inclusive, the calculation is on the old military system, and consequently includes the last nine months of the year preceding, and only the first three of its own.

Epidemic of 1850.—The second great outbreak of epidemic cholera occurred in the summer and autumn of 1850. Beyond unusual dryness (and, in this respect, similar to 1837 and 1848), the meteorology does not appear to have differed from former years. Up to the end of May the troops were very healthy; and, although diarrhœa was unusually present among the natives, it was not until the early part of June that it began to assume an important appearance in the military returns. At this time cholera prevailed at Tunis, many refugees found an asylum at Malta, and quarantine was established June 11th. Suspicious cases were reported in the Manderaggio during May; but the first authentic one of cholera proved fatal on the 9th June in the person of a master of a Maltese boat, four days after arrival from Susa. The next were two men who had been employed disembarking cattle from Tunis, and a soldier of the Malta Regiment, residing in the same house with these men, also died of the disease, which now spread rapidly throughout the island. The first of the military to suffer was the corps stationed at Floriana Barracks, an old naval store-house, upon the same plan as Lower St. Elmo, *i. e.*, shut in on all sides, wretchedly ventilated, with bad drainage, and much crowding. This corps (the 44th) had eight attacks and six deaths between the 25th and 29th June. An immediate removal to Fort Ricasoli and Isola Gate Barracks caused a great

* Represents the epidemic cholera years.

† The Crimean Expeditionary force, temporarily stationed at Malta,

abatement of the disease, and entirely put a stop to the panic consequent upon the scenes occurring in the Civil Hospital, immediately adjacent, and an intolerable stench from its dead-house.

Each regiment suffered in its turn. A company of the 44th, stationed for several months at San Francesco di Paolo, lost one-third of its number. It was removed to Gozo, and, within ten days after arrival, furnished no less than 26 cases and 16 deaths. After this the disease ceased in the detachment of the 44th, but made its appearance at the village of Ghain Sielem, situated at the foot of the fort, and between which there was constant intercourse. From this it spread rapidly throughout Gozo, which, prior to the advent of the 44th, had remained intact.

Dr. Burrel refers the great mortality at San Francesco di Paolo to "the stagnant and impure air of rooms, bad water, and filthy condition of the latrine and urinals, none of which were either flushed or trapped,"*—and, he might have added, its proximity to an infected district. He lays great stress upon the "hot, close, and badly-ventilated condition"† of Upper St. Elmo. As on former occasions, Forts Ricasoli and Manoel were excessively healthy.

Among the military the attacks numbered 223, with 133 deaths, the average duration of the fatal cases being 13·8 hours. During the prevalence of cholera, 407 cases of other bowel-complaints were admitted into hospital, of which one died. The admissions for the rest of the year were only 185.

The last case in the garrison occurred on the 23rd September, but the disease did not finally cease among the civil population until the 20th October, and after having caused, in Malta, 2,833 attacks and 1,551 deaths, and in Gozo, 105 attacks and 78 deaths. As on former and subsequent occasions, the lower classes suffered most, and the disease clung most pertinaciously to the narrow and filthy streets of the capital, and the casals of Curmi and Birchircara. The fleet in harbour were also affected severely. The Manderaggio, one of the lowest in situation and most defective districts in a sanitary point of view, although suffering to a considerable extent in 1837, had not more cases proportionally in 1850 and 1865 than several others of far better repute, showing that the improvements in the intervals had prevented the disease localizing itself,—a fortunate circumstance, considering the impoverished and wretched condition of the inhabitants generally.

The Ospizio di Vecchi, as usual, came in for its share early in the outbreak, as well as the madhouse, where everything sanitary was most defective. Here the disease raged with great violence, and the unfortunate inmates dropped off in numbers, until suspicion was aroused that the general state of filth and an extremely noisome latrine, might have something to do with the evil. This was at once filled up with lime, and the cholera as quickly disappeared from the establishment.

It must be observed that, even up to this time, the soldiers' privies were little better than cesspits, without flushing or trapping, whilst the urine tubs and urinals were placed inside or next the doors of the barrack-rooms. It is also worthy of note, as marking the dawn of great sanitary improvements in the Command, that, among the valuable suggestions wherewith Dr. Burrel's official report for 1851 teems, he remarks,—"Taking into view the mortality attending the two visitations of 1837 and 1850, epidemic disease, in the present sanitary condition of the garrison, could only be met properly by encampment." And we shall see, in the sequel, how effectual this recommendation proved in 1865, when it was first put into general practice.

The year following the epidemic was an unusually healthy one,—as, in fact, it well might, seeing that the population had been so well thinned, and the poor and weakly had died off. Dr. Burrel states, however, that during the first two quarters there was a predisposition to bowel-complaints among the fresh arrivals, and illustrates it by a local attack of cholera morbus, in the latter end of May, among 20 men, women, and children at Isola Gate Barracks, the symptoms, in a few cases, approaching in severity nearly to the Asiatic form. He refers it to an accumulation of nuisances in an ashpit in the immediate vicinity of the rooms.

* Annual Report for 1851. By Dr. Burrel, Principal Medical Officer.
† *Ibid.*

Up to 1854 the health of the island appears exceptional, and the meteorology of the year presents no peculiarity. The condition of the garrison was satisfactory, with no prevalence of bowel-complaints, either among the military or civil, up to Midsummer.

Being the year of the Crimean war, a great influx of troops took place from England, where cholera then prevailed. In July, the disease appeared in Valletta, and, the same month, broke out at Floriana Barracks. Thirty-six cases and 18 deaths occurred among the soldiers; and during the three months it lingered in Valetta (to which city the disease was confined) as many as 300 died. Important improvements in the construction and flushing of barrack latrines were carried out, consequent upon representations arising from this outbreak.

The transport "Medway," with Artillery bound for the Crimea, suffered severely from cholera on the voyage from England, and was obliged to put into the Quarantine Harbour. The troops were landed and quartered in the Lazzaretto, followed by 16 deaths out of 49 attacked by the disease. Health returned as soon as plenty of space and ventilation were given, the absence of which, together with want of cleanliness arising from many horses on board, were blamed as the chief causes of the outbreak.

A marked persistency of sirocco winds, and a strong predisposition to bowel-complaints among the troops, characterised the summer of 1855. The military events taking place in the East had completely changed the aspect of Valletta, now exceedingly crowded by the continuous outgoing and incoming of troops, &c.; and the constant communication with almost every port in southern and western Europe, exposed the inhabitants more than ever to any form of disease capable of being propagated by human intercourse. Cholera ravaged Italy during this year; and, towards the latter end of August, cases appeared among the corps crowding Lower St. Elmo, Fort Manoel, and Pembroke Camp. Many patients in the lower wards of the Military Hospital, Valletta, were suddenly struck down by the disease, which disappeared and reappeared again and again in the most marked manner among the inmates, and was only entirely subdued by a removal of all the cases of bowel-complaints to a temporary hospital outside the fortifications. The native population also suffered, and, like the previous year, the disease was confined entirely to Valletta. It disappeared at the beginning of November.

The autumn of 1856 was very dry, but colder than usual from a prevalence of N.W. winds. The garrison continued much overcrowded by troops from the Crimea. As the summer commenced, diarrhœa was frequent among all classes of the community. On the 18th July, cholera made its appearance in a company of Sappers, encamped in one of the ditches at Floriana, and spread among the inhabitants to an alarming extent, so that the occurrence of an earthquake on the 12th October, and a heavy thunderstorm shortly afterwards, were wistfully looked to as certain to put a stop to its ravages; the reverse, however, took place. On the 22nd the 31st Regiment, at Chambray, Gozo, was attacked and lost thirty-two men in fourteen days. The disease finally disappeared at the middle of November.

It is thus apparent that 1854, 1855, and 1856, each had its cholera visitation. At the same time it is known that Malta was subjected to an extraordinary influx of troops from the East and West, besides great overcrowding both among the civil and military population; that during the above period cholera prevailed in England and the East, from whence vessels were constantly arriving; and that as soon as the war had ceased, and everything assumed its wonted shape, the disease disappeared. The history of each outbreak was not sufficiently studied at the time to enable us to ascertain its onset with accuracy. There can be no doubt, however, that if the disease is propagable by intercourse with infected persons, such an arrival as the "Medway" from England was sufficient to originate it; again, if it can be generated by excessive crowding, bad air, foul drainage, and such unsanitary conditions, these elements for its production existed in greater force than before, or, perhaps, since; allowing that they only maintain the disease, and that its origin and propagation are mainly the results of atmospheric conditions every way unknown to us, there still remains the great sanitary experience of former and present years to show that when those evils are removed the disease ceases to exist.

For the last eight years, with the exception of 1859 and 1860, Malta has enjoyed a marked immunity from bowel-complaints, and considering the great increase of the population and strength of the garrison, together with existing sanitary defects, it may in some measure be a matter of surprise that cholera has been so long in revisiting the islands. The last four years have, however, been characterised by many important improvements in soldiers' quarters, clothing, food, &c., chiefly through the representations of the Army Sanitary Commission of 1861; so that, as regards the military, very great good may be said to have been achieved. There still, however, remains very much to be done before the troops can be said to be placed under conditions inimicable to the growth and propagation of zymotic disease.

Cholera Epidemic of 1865.

History and Progress in the Mediterranean.—All evidence points to Arabia as being the nursery, if not the birthplace, of the epidemic. It is said to have been imported from India by pilgrims as early as the commencement of February; at all events, it can be clearly traced from Mecca to Egypt, and therefrom to many of the great seaport towns in the Mediterranean basin. According to the information furnished by Dr. Tilbury Fox, it appears that "at the end of January pilgrims, as usual, began to make their way from India, and cholera attacked many of them; but in one ship, off Moculla on the Arabian coast, no less than eighty died of the disease. There is always a good deal of sickness among the pilgrims, but this year the character of the disease was decided. From Jeddah and the Arabian coast the virus was carried to Mecca. It is believed that the especial source of the cholera was Java."*

The celebrated festival of the Kurban Bairam, which took place in May, seems to have attracted an unusual number of pilgrims this year. No less than 200,000 are said to have assembled in the holy cities during the festivals; but as the pilgrims from the countries south of Mecca are usually contented with the attractions of Medinah, while those north of Mecca visit both, it is probable that this computation may refer to all the sojourners in the Arabian cities.†

It appears from the accounts of travellers that cholera, the dreaded *Rih-el-Asfar* (yellow wind), is by no means uncommon. At the time Captain Burton visited Medinah, it had previously ravaged the city on four distinct occasions, striking such terror into every one that whenever a man "vomited he was abandoned to his fate."

Among the most frightful scenes of wretchedness and abomination the cholera of 1865 made its appearance early in the spring, when the heat of Arabia becomes intense. No census was taken of the deaths, but on the official authority of Colluci Bey, President of the Egyptian Board of Health, as many as 100,000 are supposed to have perished. "Every mosque was filled with dead bodies, and heaps of corpses lay uninterred in the streets, or exposed in the graveyards by the drifting of the desert sand with which they had been barely covered, and the offal, from millions of sheep that were sacrificed on the occasion, lay festering in the sun."‡

The interest and importance of tracing the course of epidemic visitations is a sufficient reason for dwelling on this part in the history of the epidemic of 1865. Corroborating, therefore, what has just been said, we quote the following from the writings of an eye-witness who was himself an actor in the scenes he describes. Speaking of the revolting sacrifices in Muna, a crater-like top near Mecca, he says, "Literally the land stank. Five or six thousand animals had been slain and cut up in this devil's punchbowl. I leave the reader to imagine the rest. The evil might be avoided by building '*abattoirs*,' or, more easily still, by digging long trenches, and by ordering all pilgrims, under pain of mulct, to sacrifice in the same place. 'Inshallah' and 'Kismet' take the place of prevention and cure; and at Mecca, the head quarters of the faith, a desolating attack of cholera is preferred to the impiety of flying in the face of Providence, and the folly of trying to arrest inevitable decrees."§

* *Lancet*, September 2nd, 1865.

† Burton considers that the numbers are religiously exaggerated to give importance to the pilgrimage. He estimated as many as 53,000 on the Mount Arafat alone during the sacrifices of 1853.

‡ Extracted from a reliable private letter. § El Medina, by R. F. Burton.

Thus, once generated and intensified, the disease spread wherever the wretched creatures went; augmented no doubt by the total neglect of personal cleanliness which, as a matter of duty, characterizes the "Hadji" on his sacred journey; for then he never doffs his garments, and should he die his filthy rags are carried back to his native land by one of the survivors, and distributed among his well-wishers and friends as memorials of his pilgrimage.

Whatever may have been the previous course of this epidemic, three things are clear and indubitable:—

1st. That it sprang into frightful proportions during the orgies in and around the holy cities of Arabia.

2nd. From thence it was conveyed by the pilgrims to Egypt and shores of the Red Sea.

3rd. From Egypt it was borne to more distant parts by human intercourse.

These points, clearly established, leave little or no occasion to seek for its propagation by either epidemic or pandemic constitutions.

In the beginning of May, pilgrims from Mecca began to pour into Cairo and Alexandria. The first case of cholera was officially reported in the latter on the 11th June, in a crowded suburb inhabited by Maltese and Arabs; and from thence it radiated throughout the city. On the 20th June, Cairo is stated to have been attacked, and Damietta later on (the exact dates are not reliable for obvious reasons);* whilst Upper Egypt, and cities not in the homeward track of the Hadji, at first escaped; just as subsequently, along the shores of the Mediterranean, were those seaports first affected that had the closest maritime intercourse with Alexandria.

Although the scorching "camsin" at the end of June at once intensified the disease, yet, as usual on all such occasions, the ungrateful and degenerate Egyptians blamed the precious north winds, and their "faithful and best friend, Father Nile," in consequence of the latter having risen six inches during the week before the outbreak, which, it must be observed, was synchronous with intensification of the summer heat.

Suez and Aden were attacked early, and we read of the pilgrims introducing the disease at the latter end of July into Bushire, Bagdad, Damascus, and cities on the shore of the Persian Gulf. At Jeddah, the port of embarkation from Mecca, in two days upwards of 20,000 pilgrims are said to have died. At the latter part of June, or early in July, it had broken out at Malta, Smyrna, Syra, Constantinople,† Beyrout, and Jaffa,§ after the arrival of vessels from Alexandria with cholera on board. Ancona, the port where all vessels touch at on their way to Trieste, was affected about the middle of July, after reception of cholera patients into the Lazzaretto;‡ Gibraltar on the 21st; Marseilles on the 23rd, followed by its appearance at Valencia, Barcelona, and Majorca. From Constantinople it spread to Trebizonde and Varna, creeping along the coast line to Galatz and towns at the mouth of the Danube, and running up to Rustchuk, Tchernadova, and Kustendjie, the latter end of August. Odessa was affected at the commencement of September, and from thence the disease spread throughout the towns of southern Russia, and was carried by travellers to Altenberg and Werden in Germany. Seville was attacked about September 8th, Southampton on the 23rd, while Naples and Oporto remained free until late in October. It was carried by French troops from Marseilles to Algiers, September 26th,‖ without apparently spreading.¶ The Isle of Candia was not attacked until the middle of August, whilst

* It is well known, however, that cases were occurring in Cairo and Alexandria long before any public announcement was made.

† Introduced from Alexandria, June 30th, by a Turkish man-of-war. "Dr. Dickson and Blogg, Medical Times and Gazette, September 30th and October 7th, 1865."

‡ First case, July 1st, in a small Greek vessel, arrived in the harbour from Alexandria.—*Lancet*, September 30th, 1865.

§ When not otherwise stated, the information and dates are taken either from official telegrams or private accounts of a reliable nature.

‖ *Lancet*, October 7, 1865.

¶ Subsequent information in December showed this to be a mis-statement. The disease ravaged Algiers and the district of Oran.

Map 1. *Shewing the Seaports in the Mediterranean Basin affected by* Cholera *in 1865, as well as the course of the disease from Mecca to Alexandria and its radiation thence.*

Drawn by Asst Surgeon Welch.

Day & Son, Limited, Lith.

Greece, Sicily, Tunis, the Ionian Isles, Cyprus, and many of the Grecian Archipelago escaped altogether. The port of Messina stoutly refused from the very first to allow any one to land from infected ports, adopting the system called *sfratto* (most rigorous and barbaric prevention of the least imaginable intercourse); while the Bey of Tunis imposed a long quarantine on all such arrivals, obliging them to pass it on an island at some two miles distance from the capital.

Referring to the sketch map (1), and the data just given, it is clear that the disease radiated from Alexandria to the seaport towns of the Mediterranean in the exact ratio of the frequency of their communication with it, and that these towns became new foci for its propagation to others, and into the interior, by means of maritime and land communication. As instances of the latter, we cite the spread of the disease from Jaffa to Jerusalem, from Beyrout to Aleppo, from Ancona to San Severo and surrounding cities, from Marseilles to southern France and Paris, Valencia to Madrid, Odessa to Altenberg, &c.; whilst, on the other hand, intermediate countries, seaports, and islands, not in direct communication with infected places, escaped entirely, or were only attacked long after the disease had culminated elsewhere. These facts are incontrovertible, and whilst they furnish indubitable proofs of the communication of cholera by human intercourse, strongly militate against the existence of a "general epidemic constitution" in the Mediterranean basin.

It is apparent that, even could such a measure as *sfratto* be applied to Malta, irrespective of the total insulation of all maritime intercourse, there is the history of the late cholera epidemics and plague to show that the disease obtained admission into the Island before any official announcement had been received of its existence elsewhere. Taking into consideration the position and intercourse between Malta and other seaports it is evident, that in order to obtain immunity from cholera and such like diseases, nothing less than the most rigorous isolation from the very first signs of the disease in the infected regions will be at all likely to prevent its introduction, a proceeding in the present order of things clearly impracticable; for how, under such a government as Egypt, is such information to be obtained, while in other and more civilized countries, the harbingers of the common storm are either overlooked or religiously misrepresented in order to prevent alarm? It is when the so-called "choleraic diarrhœa's," gastro enteritis, &c., have merged into cases of spasmodic cholera that the public begin to think of quarantine; then what was intended as a safeguard becomes at best an useless measure.

Malta is the well-known coaling station for almost every British vessel that ploughs the Mediterranean, besides the numerous mercantile fleets of other nations. Three days' steam leads to Alexandria, Sicily on a clear day is visible from her shores, and Marseilles is reached in two and a-half days. The Maltese are a wonderful prolific race, and are fast spreading themselves over the seaboard of the great inland sea, either in connexion with trade, or as squatters on African soil; but no sooner does an epidemic disease appear among them in their adopted countries, than they flock back in thousands to their native islands, bearing not only disease to their fellow-countrymen, but doubly ensuring their destruction and their own by the excessive crowding and wretchedness that must necessarily take place in two small islands, the combined superficial area of which does not exceed 115 square miles. Thus, each year adds to the evil, and every available cellar is more and more in request, whilst the elements of all that is necessary for the growth and maintenance of zymotic disease become more and more apparent. Under such conditions there can never be much hope of excluding epidemic disease by any prohibitory measures that quarantine can command.

Previous State of Malta.—With the exception of a roseoloid eruption, called "spurious measels,"* a true rubeola in the autumn of 1863 and 1864, and a bad form of typhus in the casal of Zeitun, and a few of the other crowded and dirty villages, in the latter part of 1864 and early portion of 1865, there were no indications of a bad condition of the general health. The meteorology of the first half of 1865, contrasted with the same period of 1864, shows that the

* See a description of this epidemic by Assistant-Surgeon Welch, 1st Battalion 22nd Regiment, in the Edinburgh Medical Journal for July, 1865.

former differed in an high equable barometer, a high temperature, a rainfall of ·36 inches against 1·27, a prevalence of N.E. winds, and an excess of ozone in the ratio of 4 to 3. Thus far all the cholera years have been characterized by dryness and high temperature, yet we find that other non-epidemic years excelled in these particulars. Thus, while the state of the weather was such as to foster zymotic disease when present, there was nothing in the meteorology in general, nor in the health of the community at large, to warrant a supposition of the outbreak which followed.

Origin of the Cholera in Malta.—Towards the end of May and commencement of June, the harbingers of the coming storm began to show themselves in the shape of fugitive Maltese from Alexandria; at the same time also pilgrims were returning, and now and then a vessel laden with them put in for coal. Quarantine was established on the 14th June, and one of the very first vessels that arrived had lost, at least, one of its crew from cholera on the passage from Egypt; but as no medical officer was appointed to the Lazzaretto until the 22nd, authentic accounts of the state of health of the inmates are not forthcoming; still, on the first visit of Dr. Grillet on the 23rd, two cases of severe choleraic diarrhœa presented themselves, and of such a character as to warrant a special report. After the establishment of quarantine,* scarcely a vessel arrived up to the appearance of the first authentic case among the residents that had not had either a casualty from the disease during the voyage, or landed cholera cases in the Plague Hospital. The steamer "Grecian" suffered in both these respects, and is remarkable in this particular that, on arrival, she was coaled by seven healthy Maltese from a healthy country village, within three days, whilst these men were in quarantine, every one was attacked either with cholera or choleraic diarrhœa. It is apparent, therefore, that from the first health inspection there were indications of the disease among the persons arrived from the infected port, and there is no reason to suppose that these were the first cases, for many fugitive Maltese had sought an asylum from Alexandria before quarantine was imposed, and had already mixed with the civil population. The first cases of cholera in the Lazzaretto were received from the ship "Wyvern" on the 28th June, cases of choleraic diarrhœa were admitted into the Civil Hospital on the 1st July, but it was not until the 3rd that the disease was officially reported among the natives, although at least one fatal case had occurred on the 1st at Birchircara, and included under the head "gastro enteritis."

The Lazzaretto.—The Lazzaretto is situated on a small island in the centre of the Quarantine Harbour on the N.W. of the peninsula upon which Valletta is built. It is nearly level with the sea, and composed of a series of various-shaped rooms crowded together with scarcely any regard to ventilation or light. The passages and courts are, for the most part, enclosed by walls, that pretty effectually exclude the air from the rooms, especially the large ones, which are very offensive in summer. These quarters were occupied by a portion of the 2nd Battalion 8th Foot until June, when they were gradually handed over to the civil authorities for the usages of quarantine.

A portion of this building is square-shaped, with the rooms of the upper story opening into a balcony, where, in front of the rooms, there existed in the beginning of 1865 two latrines, the drains of which passed down the wall and under the adjoining rooms. At the time referred to, the soil from the latrines had been observed breaking through the room-walls, and was extremely offensive. On the 20th May eight men, one woman, and one child, belonging to the companies of the 2nd Battalion 8th Regiment occupying these quarters, were attacked by nausea, vomiting, purging, pain in stomach, cramps, and coolness of the surface, which yielded to treatment in the course of a few hours. Dr. Ross, the medical officer in charge, after a careful and searching enquiry into the habits, feeding, &c., of the individuals attacked, could not discover any other local or personal cause to account for such a morbific influence acting in so small a space and time; while the patients themselves persisted in blaming the offensive effluvia

* From the 14th June to the arrival of the steamship "Grecian" on the 5th July, there were landed in the Lazzaretto from Alexandria 1518 persons, nearly all natives of the Islands. At one time no less than 1216 occupied this building, causing much crowding, discomfort, and wretchedness. After the 26th July the crews of the vessels arriving were free of the disease.

from the latrines, which were becoming more and more noisome with the approaching heat of summer. The latrines on being deodorised were shut up, and no more cases occurred. Similar examples of sudden diseases of a choleraic character, irrespective of the presence of cholera, have been of frequent occurrence in the garrison, and always under like circumstances, so as to point to the belief that the unhygenic conditions, above stated, were in all probability the sole cause of the above and similar local outbreaks.

Although the cases of epidemic cholera just furnished were the earliest among the civil population, the disease had manifested itself among the military in a marked and unmistakeable manner for nearly a fortnight previous to its first appearance among the inhabitants, and before a genuine case was reported among the persons undergoing quarantine in the Lazzaretto.

The Outbreak in the Plague Hospital.—The plague hospital forms the western wing of the Lazzaretto, and is composed of six blocks of small houses, arranged in two parallel rows, separated from each other by a partition wall, and the whole enclosed by walls much higher than the roof of the buildings. Each block consists of double rooms, back to back, low in the roof, and about 12 feet by 9 in superficial area. The building is within a few yards of the Quarantine Harbour, and its level nearly if not the same as the sea. The walls of the medical officer's house forms its boundary on this side, and effectually cuts off all ventilation from that quarter. The drain which leads from the privies opens above the sea-level on a very foul and noisome beach, so that when the wind is in the requisite quarter, the effluvia is carried from the drain through the small untrapped openings in the narrow passages in front of the rooms into the dwelling itself. The portion of the Quarantine Harbour usually used as anchorage is contiguous to the aforesaid beach. At the time of the outbreak, and for several months previously, these quarters were occupied by the married families of a part of the Royal Artillery and 2nd Battalion 8th Regiment. They had made frequent complaints concerning the foul air from the privies and sewer openings, and as the heat of the weather increased in June this was occasionally unbearable; and so much so as to lead to a closure of the sewer openings. In this place the first cases of cholera occurred, and seldom has the disease broken ground under more congenial circumstances.

Before proceeding to details, on the accuracy of which so much of the value of this portion of the history of the epidemic must depend, it may be stated that they were furnished by Mr. Comyn, R.A., on whom the medical responsibilities connected with the Brigade had devolved, and that the scrupulous care with which he noted every point of interest, and the ability, firmness, and energy he brought to bear on his onerous duties, give additional weight to his statements.

The facts are briefly these:—Diarrhœa had been prevalent among the families for some time. A girl of eight years of age was suddenly taken ill at 9 P.M. of 20th June, and died within seven hours, she was attended by Assistant-Surgeon Ross, 2nd Battalion 8th Regiment who pronounced the disease to be genuine Asiatic cholera. A woman, residing a few doors higher up, was attacked on the 22nd, and on the evening of the 23rd the mother of the girl. On the 27th, a man and child of the 8th Regiment, residing in the second row, were attacked with choleraic diarrhœa; and on the 28th, another man of the Royal Artillery, and the child of the first woman affected, with the most virulent symptoms of the disease. Only one of all these recovered.

The privies were of the usual native construction, being a sloping trough with a hole and plug at the lower end; and were situated at the upper and higher level of each block of quarters. In spite of all attempts, even now they were very noisome, and into them were thrown all the cholera dejections, vomit, &c. As the families of the Royal Artillery and the 8th Regiment lived in separate rows, each corps used its own latrine.

In hopes of ventilating the enclosure, the high walls were partly knocked down on the 29th; but, on the day previously, Mr. Comyn urgently recommended the immediate removal of all the families from the infected spot, and suggested that they should be encamped at some distance on a dry and airy ridge close to Fort Tigné. On the 1st July the families of the Royal Artillery were transferred to Saint Salvatore Counterguard, on the other side of the

harbour, almost directly opposite to the Plague Hospital, and those of the 2nd Battalion 8th Regiment to the Crown Works, Floriana.

At the time of the removal there was hardly one member of the thirty-four families that was not suffering from diarrhœa "malaise," or, to use their own words, were "sick in the stomach;" and scarcely had those of the Royal Artillery settled down in their new quarters (*i. e.*, on the same day, and within a few hours of leaving the Plague Hospital), than five were attacked with cholera.

St. Salvatore Counterguard.—St. Salvatore Counterguard is a small work situated under a very high bastion, on which Floriana Barrack, occupied by the 2nd Battalion 4th Regiment is constructed. It is also close to, and on a line with, the Ospizio di Vecchi, to which we shall refer afterwards. Its shape is irregular, consisting of five ill-ventilated, dark, casemated rooms formed in the bastion, and is shut in at each end. The drainage is defective, and enters the harbour immediately below the work. There are two privies on the plan just described. Situated in what may be called a narrow lane, and closed in on all sides, it is most unsuitable for human habitation.

As the cholera cases could not be removed elsewhere they were left in the rooms, and the remainder of the healthy families were on the same evening placed under tents at an eligible site of about 150 yards distance. On the 3rd July, a woman who had not been at the Plague Hospital, but was officiating as nurse to these patients, contracted the disease and died in five hours. On the 6th her child was taken ill, as well as two men living in the tents; on the 7th another man, and on the 9th the wife of a sergeant in charge of the Counterguard; whilst on the same day a gunner was admitted into the General Hospital, who had been taken from Fort Tigné to act as fatigue-man about the cholera tent and St. Salvatore. The last case in this small detachment occurred on the 11th after the disease had attacked seventeen and killed ten.

During its prevalence in St. Salvatore and the tents, Mr. Comyn devoted strict attention to the disinfecting of dejections, flushing and deodorisation of the latrines, destruction of infected clothing and bedding, &c. On the 14th July, after the St. Salvatore rooms had been fumigated, cleansed, and white-washed, they were reoccupied by the remainder of the ill-fated occupants of the Plague Hospital, who soon regained their wonted health.

No case of cholera occurred among the families of the 2nd Battalion 8th Regiment after removal, and the diarrhœa and sickness quickly subsided; but one importat ramification ensued among the Royal Artillery as follows. A woman, residing in St. James' Cavalier, who had not visited the cholera patients or been near the infected locality, took charge of an infant belonging to a woman who died in St. Salvatore, on the 10th July. The child was apparently in good health, but cholera supervened on the 16th, and proved fatal in four days. On the 26th this woman was attacked and attended by her husband; he in his turn contracted the disease on the 30th, and died the same day. No cases had occurred in this barrack before or until the child's death, when one man was attacked; and with the exception of the man and his wife stated above, a remarkable freedom from the disease was enjoyed by its inmates throughout the epidemic.

Second Battalion, 22nd Foot.—The troop ship "Orontes" was moored close to the shore, immediately under this St. Salvatore Counterguard, and at a point where all the drainage and sewerage from that work issues into the harbour. It may be no other than a strange coincidence, but the facts are, that the 2nd Battalion 22nd Foot, in perfect health and free from the disease, embarked on board the above vessel on the 5th and 6th July, at the time that cholera was in full force among the families of the Royal Artillery above; that on arrival at Gibraltar on the 10th, the battalion was encamped on the North Front; and that on the 19th, a case of cholera occurred in one of its members, followed on the 29th and 31st by others, when the corps embarked for the Mauritius. These were the first recorded cases of cholera on the Rock, and it is worthy of note, that the disease lingered about the above quarters for some weeks before it found its way into the fortress. We leave to others, in possession of all of the facts of the case, to trace the immediate links of this chain of evidence with reference to the importation of the disease from Malta to Gibraltar.

PROGRESS OF THE CHOLERA AMONG THE MILITARY.

Floriana Barrack and Huts at Ravelin and Horn Work.—The plan and construction of Floriana Barrack are extremely defective. It is an old casemated store-house, dark and cheerless, occupying the further end of an enclosed space, which is bounded on one side by a parapet, and on the other by a line of lofty buildings forming the Civil Hospital, the drainage of which passes under the barrack-yard. Independently of what has been already adduced concerning this barrack in previous visitations of plague and cholera, there is abundant evidence to show that it has maintained always a high ratio of admissions and deaths from fevers, &c, and has borne a very unhealthy character generally. The parapet overlooks St. Salvatore Counterguard and the Ospizio di Vecchi, whilst the Civil Hospital is contiguous to it; consequently the 4th Regiment were eye-witnesses of all that was passing in these buildings.

On the 13th July, an officer's servant was attacked, as well as the wife of a private soldier. The alarm engendered by the circumstances above stated now broke forth in a regular panic which lasted for two days and nights; men and women were in the greatest state of excitement, fancying they had caught the disease. From its first appearance every attention was directed to sanitary measures and cleanliness in barracks; the overcrowding was relieved by tents pitched under the trees at the bottom of the adjacent parade-ground, frequent medical inspections, and room to room visitation by the Medical Officers were made. A hospital marquee was erected in consequence of the great distance between the barrack and the General Hospital, and there the cholera cases were treated, every precaution being taken by the destruction of infected bedding and the disinfecting of the dejections, which were buried in pits. Cases continued to occur daily. On the 25th of July, the admissions reached to three; and the disease showing a strong tendency to localize itself in the barrack, Surgeon Lane promptly recommended the immediate removal of the battalion from the infected locality, citing Citta Vecchia or St. George's Bay as suitable for an encampment. At the suggestion of Dr. Anderson, Principal Medical Officer, the men were at once placed under canvas upon the adjoining parade-ground, and preparations made for a further move if necessary. Four attacks occurred upon the three following days, but the chain of the disease was broken.

Thus, by simply sleeping in the tents, and continuing to use the barrack, its latrines, water-supply, &c., during the day, a sudden check was given, although the measure failed to eliminate the disease entirely, as nine cases at intervals occurred during the two following months.

As a contrast to Floriana Barracks, the three companies of the same corps occupying the huts at the Ravelin adjacent, furnished not a single case.

The married families inhabited several old, badly-constructed, and dilapidated huts in an exposed outwork (Horn Work) surrounded by a curtain. The latrines were mere cesspits close to the gateway and in the immediate vicinity of the huts, always very foul and contaminating the atmosphere with a privy odour for some distance around. The disease appeared among the married families on the 13th July, and continued up to the 29th, when, at Mr. Lane's suggestion, all the families were placed under tents upon the same ground as that occupied by the men. The beneficial result of this measure is shown in the fact that whereas, prior to the movement, nine cases of cholera and much choleraic diarrhœa had existed among the residents, with the exception of two cases on the third day after encampment, the disease entirely disappeared.

Lower St. Elmo.—Lower St. Elmo is situated in a deep sunk area contiguous to one of the lowest levels in Valletta, and is only a few feet above the sea. It is surrounded on all sides by an amphitheatre of high walls which exclude every wind. Although originally constructed as a temporary place of refuge during a siege, it has been converted into a permanent barrack, and, at the time of the outbreak, was occupied by the 100th Regiment.* Reference has already been made to its casemates—damp and badly-ventilated rooms—in connection with previous epidemics; and even now, after all the late improvements, scarcely a regiment is ever quartered here that does not suffer in a marked degree from fever and granular ophthalmia. At the outbreak its sanitary con-

* Surgeon Chartres in medical charge.

dition, latrines, water-supply, and cubic space, were as satisfactory as compatible with existing circumstances, yet the 100th Regiment gave a sick-list daily of 10 per cent. of strength, and chiefly from the diseases above mentioned. Prior to the cholera among them, there was no marked prevalence of bowel-complaints. In the middle of July, Asiatic cholera was rife in the narrow dirty streets outside the barrack, and especially in one portion of the district frequented by the soldiers for drink, &c.

The first case occurred in the 100th Regiment on the 18th July, and was followed by increasing daily admission until the 27th, when, at the urgent request of Dr. Anderson, Inspector-General of Hospitals, the battalion was placed under canvas on the glacis of Fort Manoel. This measure at once checked the spread and virulence of the disease, for, while 15 cases originated in Lower St. Elmo, only one of which recovered, merely three solitary cases were admitted into hospital from the encampment. Out of three men left in the fort after the departure of the battalion, two succumbed to the disease. The quarters were reoccupied at the end of September.

Military Prison, Lower St. Elmo.—The Military Prison* is within the area of Lower St. Elmo, but on a higher level. The interior sanitary arrangements are very defective, especially a horizontal ventilating shaft which opens below and externally in front of a privy door in the barrack area, and internally and above, on the floor of a corridor close to the cells. The odour from the inner grated opening was often exceedingly offensive, and necessitated the closing of the shaft. The chief warder, wife, and three children occupied a few small low-roofed rooms at one end of the prison, the privy being situated in a little cell near the kitchen door, and all surrounded by a high wall. The family had enjoyed good health, and held no communication with the inmates of the barracks. On the 20th July one of the daughters fell ill with the cholera, and was nursed by her sister, residing at Floriana, who likewise contracted the disease on the 21st, and was followed, on the 25th, by the mother and another daughter;† whilst the Prison Chaplain, who had been in constant attendance upon the sufferers, was attacked on the 24th. The dejections were thrown into the privy, which continued to be used by the family. The disease raged here and in the barrack adjoining at the same time, and, had it not been for the move to Fort Manoel, there can be but little doubt as to the consequences to the 100th Regiment. Within the small area of Lower St. Elmo, during the last twelve days of July, no less than 19 cases of cholera occurred, 15 of which were fatal. The violence and virulence of the symptoms in many indicated that the virus had become fearfully intensified in this damp, low, and imperfectly-ventilated situation.

Pembroke Camp.—This newly-constructed barrack is well situated on the side of a little creek, with a gentle slope towards the sea, and is distant about five miles from Valletta. During the epidemic it was occupied by detachments of the 2nd Battalion 8th, 29th, and a few married families of the 100th Regiments.‡ The latrines and drains, from their defective construction, are always offensive. One of the latter passes close to the water tanks, which, although cemented, are dug in a porous limestone, and finally empties itself into the sea within a few feet of the married quarters. There is also a cesspit latrine close to the huts which is a constant annoyance, otherwise no marked defects exist in this generally healthy barrack.

The first two cases of cholera among the men occurred in the persons of a telegraph and orderly-room clerk, who were constantly employed in rooms down the walls and under the floor of which passed a latrine drain, the contents of which oozed through the soft freestone. This barrack furnished, between July 27th and September 9th, eight isolated cases of cholera.

The married quarters consist of a block of well-constructed rooms close to the water's edge. There is no marked defect beyond the opening of the barrack latrines into the sea close by, yet 10 cases occurred in the building between the 20th July and the 22nd September. Staff Assistant-Surgeon Adcock remarked, "that several cases of cholera and choleraic diarrhœa originated in the rooms

* Staff Assistant-Surgeon Roberts in medical charge.

† We are informed that, in 1850, much the same events occurred, only the inmates of the cells participated in the disease.

‡ Staff Assistant-Surgeons Creyk and Adcock in medical charge.

in the immediate vicinity of the above-mentioned offensive privy drain, which was barely covered, at that time, by a little earth and loose stones, and penetrated by numerous rat-holes."

Forrest Hospital.—The hospital* of Pembroke Camp is a detached building a quarter of a mile distant, and, excepting its position, has little to recommend it, being an old private dwelling. Four cases of cholera occurred in this hospital in patients affected with other complaints, and followed, within a few days, the admission of men from the barracks labouring under the disease. Any further dissemination of the virus was effectually stopped by prompt sanitary measures suggested by Dr. Anderson, Inspector-General of Hospitals.

The 1st Battalion 22nd Foot,† during and for some time before the epidemic, was quartered in the very populous and unhealthy districts of Isola, Burmola, and Vittoriosa, on the eastern side of the Grand Harbour; nevertheless it had enjoyed a very high standard of health, inasmuch as, for several preceding months, the sick-list did not average more than 2·3 per cent. of strength. Cholera prevailed for five weeks and upwards among the natives in the narrow, filthy streets adjacent to the barracks before any of the regiment were struck down. A portion of its married families occupied a series of small pigeon-hole like rooms in the walls of St. John's Curtain, in the outer land defences near Polverista Gate. The cubic contents of each room did not average more than 1,179 cubic feet, the door and a small window above it were the only means of ventilation. Two, or sometimes only one, of these rooms were appropriated to each family. There is no drainage, and the sewage, &c., is either thrown in front of the cabins, or cast into the latrine, which is a mere cloaca situated in an angle of the fortification, and about the centre of the row. The only redeeming point is the high elevation of the ground they occupy.

On the 28th July, a soldier was attacked in one of the above quarters, and removed immediately to the regimental hospital. Apprehensive of the disease spreading among the women and children, every preventive measure was adopted in the man's family and room; a hospital marquee was pitched in the neighbouring bastion, and special nurses engaged. On the 14th August, and two following days, a soldier and his two children residing in a room close to that just mentioned, were seized by most violent symptoms of cholera, and all perished, the wife, a native, escaping. Soon afterwards, a few cases of choleraic diarrhœa occurred in the families of the adjoining rooms, when the disease disappeared from the quarter, doubtless owing, in great part, to the stringent measures had recourse to.

Polverista Barrack.—In the same wall, northwards, are situated the rooms forming the Polverista Barrack, occupied by four companies of the 22nd Regiment. The rooms are long, narrow, fairly ventilated, and not overcrowded; but the latrine (Jennings'), situated very objectionably at the end of the row, was always with difficulty kept in order, consequent on its small size compared with the number using it. The result was that the smell at night polluted the atmosphere of the adjacent rooms, and led to their abandonment on account of the increasing admissions of diarrhœa they furnished. Polverista Barrack faces the Burmola district, and stretches across the watershed of a large ravine, but is high in situation, with a free open glacis in front. Only three isolated cases were admitted from this quarter at the height of the epidemic.

Married Quarters of the 84th Regiment.—Farther northward, and on its right flank, is an admirably detached block of buildings lately erected, and immediately behind them, in the wall of the Polverista Gate Bastion, are several large and well-constructed rooms; the one occupied by married soldiers of the 84th Regiment, and the other by a few of the 1st Battalion 22nd Foot. The means of ablution here are excellent, but, we regret to say, not much used. The latrines (Jennings'), common to both buildings, are well supplied with water; still, from the carelessness of the married people, great difficulty was experienced in keeping them salubrious, so that, at times, and especially about the period of the outbreak, they were excessively offensive. It is to be noted, also, that the persons occupying these quarters were in the habit of passing daily through the densely crowded and filthy streets of Cospicua, where the disease was then raging.

* Staff Assistant-Surgeon Crisp in medical charge.

† Surgeon Adams in medical charge.

Zeitun Gate.—Somewhat more northward still, are several badly-constructed cells, similar to those of St. John's Curtain. The latrine is an ill-constructed cloaca. Between the 5th and 10th August, three cases of cholera occurred among a few families of the 84th Regiment, occupying these last-mentioned quarters; and, in the aforesaid new blocks, three cases in the 84th Regiment, and one in the 22nd Regiment between the 5th and 29th of the same month. Diarrhœa was very prevalent during the same period, as is exemplified by the fact that no less than 27 children of the 84th Regiment died of the affection between the 1st June and 31st October.

San Francesco di Paolo.—The occurrence of one case at San Francesco di Paolo Barrack, and the prevalence of an increasing amount of diarrhœa in the two companies of the 1st Battalion 22nd Foot, together with its sanitary defects, its vicinity to a close infected district, and a knowledge of the events in the detachment of the 44th Regiment in 1850, led to its evacuation very early, the men sleeping in tents on the Polverista glacis, and occupying the rooms during the day. With the exception of one soldier-servant, these companies furnished no further admissions.

Isola Gate Barrack.—Isola Gate Barrack is badly situated, and, with one exception, all the rooms are badly lighted, and the upper scarcely habitable. The four companies of the 22nd Regiment occupying it gave only three dropping cases at long intervals, and as each occurred, it led to the entire removal of the men from the infected rooms to tents with the others on the Polverista glacis. Here again the precautionary measures had recourse to, and the admirable promptitude with which they were carried out by Colonel Harding, C.B., the officer in command, were probably the means of saving many lives.

Burmola Curtain.—Burmola Curtain is a series of comfortable married quarters, well ventilated, with an excellent water supply, well-flooded latrines, and good means of ablution, the last unfortunately little used. These rooms are built in the interior wall of a curtain, high up, and above the level of the native houses in the vicinity. At the time of the outbreak the disease was steadily declining in the native population. The Burmola Gate passes under this range of quarters, and has two sewer openings at its entrance. The odour from these was very offensive following the first fall of rain on the 13th September, so much so that the attention of the civil authorities was directed to it. On the 23rd a married woman residing in these quarters occupied by the 22nd Regiment, was attacked with cholera; and four days subsequently a soldier and his wife who nursed the child of this woman, contracted the disease, as well as another woman occupying a room in a distant part of the building, but who had had no communication with either.

Every available preventive measure was put in force, and the disease did not further spread.

Sanitary Measures in the 1st Battalion 22nd Foot.—The sanitary measures adopted in this corps, from the very commencement to the termination of the epidemic, were—

1st. Room to room visitations, with appropriate medicines for the diarrhœa, every man applying twice within a few hours being sent to hospital. Placards posted on the latrine doors.

2nd. Latrines having a water supply were flushed twice or thrice daily with solutions of chloride of zinc or lime; cloacæ, cesspits, and open sewers, treated by quicklime, peat charcoal, or chloride of zinc.

3rd. Dejections, &c., from infected persons, immediately destroyed by disinfectants; and, in the case of female hospital tent, afterwards buried in deep pits.

4th. All infected bedding or clothing either destroyed or subjected to the influence of boiling water and disinfectants.

5th. Infected barrack-rooms and married quarters evacuated, fumigated, and whitewashed previous to reoccupation.

6th. Dead buried as soon as possible.

7th. Daily medical inspections of the soldiers' rations, and constant supervision of barracks, latrines, and the neighbourhood surrounding.

Fort Verdala.—This barrack was occupied by the 84th Regiment,* which

* Surgeon Clark in medical charge.

arrived from England at the commencement of the summer months. Although deficient in means of ventilation and light, from the loop-holed and casemated state of the rooms, it is otherwise one of the best barracks in the island, well situated on a rising ground above the level of the neighbouring town of Burmola.

As usual with fresh arrivals, "bowel complaints of slight character, but easily cured," were very common, and continued up to the second week in August, when "they assumed a choleraic character, and were less amenable to treatment." During the latter end of July and August the disease was rife among the natives in the vicinity. The first case appeared in the 84th Regiment on the 17th of the latter month, after which dropping admittals were taking place weekly until the 20th September, when no less than five were admitted into hospital. At this time one of the drains in the barrack square, close to and opposite the doors of the men's rooms, was choked up and required to be opened, when it was found filled with sewerage. For some few days prior to the occurrence of these attacks it was observed to be very offensive, and the drain from the men's latrine, situated close by, joined this drain near where the opening was made. The water supply of this barrack has to be conveyed in carts, and in consequence the flushing of the latrines is very imperfect.

On the 28th August, at the suggestion of Surgeon Clark, 218 men were removed at night to tents on the adjoining parade ground, and continued to make use of them until the rainy state of the weather necessitated a return to barracks on the 12th September; and it is to be remarked, that whilst those sleeping in the quarters continued to furnish dropping cases, only one occurred among those occupying the tents.

The hospital of the battalion (Upper Vittoriosa) requires some notice from its extremely defective construction and limited space, as well as from its position. It is occupied conjointly with the regiment quartered at Fort Ricasoli, and at the time of the outbreak was somewhat crowded, necessitating the treatment of cholera cases in the same wards with other patients. Three men were attacked with the disease while in hospital for other complaints, and one orderly succumbed to the virus.

Fort Ricasoli.—The 29th Regiment* arrived in the Command on the 1st July, and was distributed between Fort Ricasoli and Pembroke Camp—one wing, with its proportion of married families, occupying each barrack. Similar to the 84th Regiment, and all corps arriving in midsummer from England, there were numerous bowel complaints of a slight character. On the 6th July a case of cholera occurred in an old worn-out soldier at Ricasoli, and proved fatal two days afterwards. It seems to have partaken more of the character of ordinary summer cholera than of the Asiatic variety. Diarrhœa continued throughout the month, and about the middle of August "assumed a choleraic character, and was more intractable."

Fort Ricasoli occupies an isolated position on a spot of land at the entrance to the Grand Harbour, and about 40 feet above the sea level. The principal barrack-rooms are long casemates under the main land defences, on the eastern side of the fort, with several very small rooms in the recesses of the buttresses for married families, each averaging 900 cubic feet, and extremely inadequate for the purpose. The majority of the married families, however, are quartered in rooms constructed in the archings of the south-west curtain, and consist of an upper and lower range at a slight distance from each other. The rooms are arranged in pairs, one large and one small, communicating with each other by a little doorway. The two combined were originally intended for seven men, with an average space per man of 624 cubic feet, and 54 superficial feet. The air is always stagnant from want of through ventilation, and more so in the upper range, by a wall carried in front of the doors at the distance of a few feet, for the purpose of screening them from the adjacent officers' quarters, which again interfere with the ventilation. The latrine connected with the ranges is good, well flushed by sea water raised by a forcing pump, and the contents are discharged directly into the sea, which washes the wall of the bastion outside; but it is situated at fully 300 yards distance, so that the night stools, slops, &c., were usually kept in the rooms and emptied into the latrine the following morning. The dungheap is also at a very inconvenient distance.

* Surgeon-Major Moorhead in medical charge.

The result was, that before and during the late epidemic, sewage and other liquid refuse were frequently thrown into the pump drain close to the upper range, and also into a grated opening in front of the lower range, intended only for the reception of rain water.

Epidemic cholera appeared in Ricasoli on two separate occasions. During the first outbreak only one wing of the 29th Regiment occupied the fort, and of course there was no overcrowding. The first case occurred on the 8th August, in the person of a woman attacked with severe choleraic diarrhœa (cholera?), followed on the 12th by a genuine case of spasmodic cholera in a soldier occupying a cell in the same line of quarters. From this day up to the 24th, three fatal cases of cholera and four of diarrhœa ensued in the ranges of married quarters, with the exception of one from a wooden hut in the immediate vicinity. During the above period only three men were admitted into hospital at intervals from the eastern casemates.

The important points in connection with the seizures in the married quarters are—that the first case of choleraic diarrhœa was removed from the eastern wing to a room in the south-west range for the purpose of treatment, and that the persons subsequently affected resided in this range, the first case occurring three days after her removal, and the remainder within thirteen days subsequently.

A period of eight weeks elapsed between the first and second outbreak. Assistant-Surgeon Boileau, who was in constant attendance on the cases throughout the visitations, and carefully noted many of the particulars here given, states "that during this interval not a single case of cholera, nor fatal case from other disease, occurred at head-quarters; and we had hoped that the epidemic had passed away, particularly as it had almost ceased on the island."

On the 21st September the left wing and its married families were removed from Pembroke Camp, and, together with a few women not on the strength of the regiment, who had been brought into the fort at the latter end of August, created great overcrowding everywhere, and especially in the quarters where the first outbreak took place, three families now occupying the two rooms, or, in other words, the cubic space originally intended for seven men.

On the 18th October a child living in one of the quarters of the recesses above mentioned was seized with choleraic diarrhœa, and died on the 22nd. On the following day, Mrs. Reddington, residing in the upper range of the south-west quarters, died in a few hours from cholera. The woman's clothing was partly given to one who officiated as her nurse: three days subsequently the child of the latter was attacked, and died on the 27th. Occupying a portion of the same room as the latter was the Stokes family, two of whom, mother and child, succumbed to the disease before the 31st. The remainder of the woman's (Reddington) clothing was given to Mrs. Ailes, whose husband, a remarkably strong fine man, was attacked on the 30th, and died the same day. On the 1st and 2nd November, two sisters, who had been in frequent communication with the sick child Stokes, died in a room in the upper range.

Diarrhœa of a choleraic form prevailed most extensively among nearly all the inmates, especially of the lower range.

Only one solitary case occurred among the unmarried soldiers in the casemates, and none among the married families in the rooms in the buttresses; in fact it was almost entirely confined to the low-lying quarters alluded to above, and was assuming daily a more threatening appearance. On the 31st October, at the suggestion of Dr. Anderson, Principal Medical Officer, the families were removed from the lower range and placed under canvas on the adjacent parade ground. With the exception of one fatal case thirteen days after removal (and one of the last in the island), the disease ceased, the diarrhœa disappearing gradually.

The suggestive data connected with the second outbreak are—

1st. The probable diffusion of the disease by infected clothing and intimate communication between the families, and its intensification by want of cleanliness, overcrowding, lowness of situation, defects in construction of rooms, and retention of vomits and stools in the quarters during night.

2nd. The immediate disappearance of the disease, and abatement of diarrhœa, following the removal.

After the rooms were cleansed, fumigated, and whitewashed, a portion of the families returned to their old quarters.

Sanatarium, Città Vecchia.—Two cases of cholera occurred among the convalescents in this establishment,* and in persons who could have had no communication with infected individuals beyond that which we now state. One, a man of the 84th Regiment, was attacked two days after the arrival of the convalescents from cholera from Valletta, and the others six days subsequent to the reception of two other similar cases. The disease was sparsely scattered among the natives in the immediate neighbourhood, and two relations of hospital orderlies had suffered in town from the disease a few weeks previously; yet, as no cases had occurred in the Sanatarium prior to the arrival of the cholera convalescents, and as each reception was followed within a few days by an attack, the presumption is strongly in favour of a communication of the disease. Be that as it may, it suggests that great care should be taken in disposing of persons recovering from cholera, especially in those cases where it is protracted.

St. Francis' Barrack.—The Royal Engineers,† 180 strong, occupied St. Francis' Barrack, Floriana. The site is good, no overcrowding, and few important sanitary defects. Choleraic diarrhœa prevailed slightly among the men at the commencement of August, but no cholera ensued.

The married families inhabited huts in an adjoining outwork, and contrasted strongly, in their total immunity from the disease, with those of the 4th Regiment in the neighbouring bastion.

This is doubtless attributable to the greater advantages enjoyed by the former, not only in the very superior conditions under which they live, but also the increased comforts accruing from extra working pay.

Upper St. Elmo.—The Artillery in Upper St. Elmo ‡ suffered very slightly in this epidemic, compared with the former ones. The changed conditions under which they now exist sufficiently explain it. Early in the summer a portion of the men were removed to tents, and consequently no crowding existed. The first case occurred among them July 16, followed by only five dropping cases at long intervals. There was no opportunity for the disease to become localized.

Forts Angelo, Tigné, and Manoel.—Every precaution was taken in these average well constructed and situated forts against any inroads of the disease. Forts St. Angelo § and Tigné were occupied by the Artillery, and Fort Manoel by the head-quarters and three companies of the 2nd Battalion 8th Regiment.‖ Even the choleraic diarrhœa appears to have been absent among the occupants, and the health average continued satisfactory throughout the epidemic.

Other small buildings occupied by the military gave from time to time a cholera case; but as they do not bear in any way upon the epidemic as a whole, nor illustrate any point of the disease, we omit the uninteresting details, merely saying a few words upon the Malta Fencible Artillery.

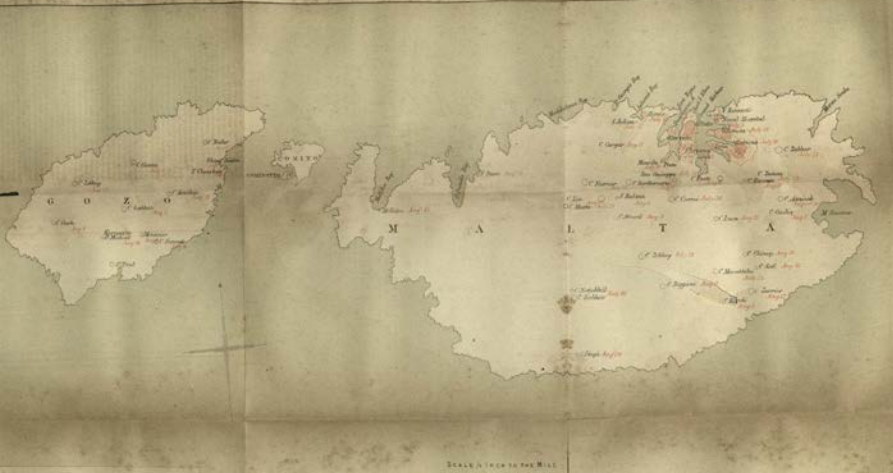
Malta Fencible Artillery and Fort Lascaris.—This corps ¶ occupied Fort Lascaris in Valletta, and St. Elena Gate and Couvre Porte, Vittoriosa, in the Cottonera lines. The interest is connected with Fort Lascaris, a bomb-proof barrack with a free exposure to the Grand Harbour. The rooms are arranged in two series, an upper and lower, the latter situated in a complete "bear-pit." Between August 13 and September 11 seven cases were admitted from this barrack, and all from the lower rooms, especially the two worst ventilated. Sanitary measures checked the disease. This corps, 294 strong, furnished ten cases, only four of which died. We have not included these in the military returns, because that, irrespective of dress and duty, there is nothing in common between the Malta Fencible and the British soldier, but the strongest contrast in all points. His habits and food are those of the natives, and with them we have classed the above cases.

The following Tables show the distribution of the cholera throughout the military, together with the percentage of attacks to strength, and deaths to attacks.

* Staff-Surgeon Blatherwick in medical charge.
† Assistant-Surgeon Ferguson in medical charge.
‡ In medical charge of Assistant-Surgeon Comyn, R.A.
§ Assistant-Surgeon Bartlett in medical charge.
‖ Assistant-Surgeon Ross in medical charge.
¶ In medical charge of Dr. Bernard, R. M. A.

	Attacks.	Total.	Deaths.	Total.	Percentage of Attacks to Strength.	Percentage of Deaths to Attacks.
Officers	1	..	1	..	·51	100
Men	120	..	87	..	2·2	72
Women	50	..	36	..	10·	72
Children	26	197	19	143	3·2	73

	Attacks.					Deaths.					Percentage of Attacks to Strength.				Percentage of Deaths to Attacks.			
	Officers.	Men.	Women.	Children.	Total.	Officers.	Men.	Women.	Children.	Total.	Officers.	Men.	Women.	Children.	Officers.	Men.	Women.	Children.
Royal Artillery	0	19	12	7	38	0	12	5	4	31	0	2·4	9·3	2·9	0	63	41	57
2nd Battalion 4th Regiment	0	22	8	1	31	0	16	6	1	23	0	3·	28·5	1·9	0	72	75	100
2nd Battalion 8th Regiment	0	6	3	6	15	0	5	2	5	12	0	0·7	5·3	5·4	0	83	66	83
1st Battalion 22nd Regiment	1	13	5	2	21	1	8	4	2	15	4·5	1·8	9·6	2·5	100	61	80	100
29th Regiment	0	18	9	2	29	0	16	9	2	27	0	2·5	13·2	2·2	0	88	100	100
84th Regiment	0	20	4	3	27	0	12	4	3	19	0	2·7	5·7	3·3	0	60	100	100
100th Regiment	0	22	4	4	30	0	18	3	2	23	0	3·1	5·5	4·5	0	81	75	50
Staff and Army Hospital Corps	0	0	5	1	6	0	0	3	0	3	..	..	..	..	..	..	..	..



The attached sheet is each Village indicates the Line of the outbreak

Table of the Towns and Villages of Malta and their arrangement in their geodetic position, where the sea level commencing with the lowest together with the number of Attacks and percentage to their population.

Towns	No. of Attacks among that pop.	Percentage to that Population
Vittoriosa	176	2·7
Cospicua and Burmola	174	1·5
Isola or Senglea	93	1·4
Valletta	451	1·7
Floriana	76	1·3

Villages	Attacks	Percentage
Pieta and Msida	18	4·4
Gluiana	18	7·4
Santa Saluiana	6	7·2
Millieha	3	3
Mgarr	12	2·5
C. Ponte	3	6
Bay Cocoppa	23	3·2
Mediterranea	102	2·2
Lia	12	67
Salina	1	11

Villages	Attacks	Percentage
Zebbug	37	
Barracca	23	
Attard	19	
Zeitun	104	
Ascanda	37	
Casha	17	
Lecca	70	
Dingli	5	
Zebbug	39	
Siggiewi	20	

Villages	Attacks	Percentage
Musta	12	37
Naxxaar	53	1·3
Chircop	4	37
Gal	9	2·1
Zarrico	34	1·3
Gargur	9	28
Zeitlauk	107	1·4
Dingli	1	11

Villages of Gozo	Attacks	Percentage
Garbo	23	4
Chasa Gelsina	1	64
Mnaxxar	13	8·8
Zaudico	36	2·8
Rabbatto	177	4·8
Xaxxali	47	3·2
Xarrato	27	2
Gharin	27	3·8
Zebbug	32	5·3
Xaghar	12	3·9

Jno. L. Hall, Lieutenant R.E.

PROGRESS OF THE DISEASE AMONG THE CIVIL POPULATION.

Sanitary Condition of Malta.—There are few countries more densely populated than the Maltese Islands. No less than 134,055 human beings, according to a census made in 1861, are spread over 115 square miles, *i. e.* 1,248 to each statute mile in Malta. In Gozo there are 20 square miles, and about 772 inhabitants per mile. The increase of the population of both isles, for the ten years ending December 1861, was 10,559, exclusive of the army and navy. The greater part of Malta is covered by human dwellings, and there is scarcely a village within eight miles of Valletta that a great portion of its labouring classes does not resort to the capital for employment and daily occupation, thus causing an excessive overcrowing by day, and which is only partially relieved at night by the exodus of the above to their homes. Hence the facilities wherewith infectious diseases can be conveyed from village to village, and the difficulties experienced in tracing the communication of a disease unless the above circumstances are taken in their proper appreciation and value.

The surface rocks on which the chief cities and villages are built are either a soft porous limestone, or, as in the case of Valletta and its neighbouring cities, a soft freestone which readily imbibes water to the extent of one-third of its bulk. Through the rock the drains and sewers are cut; in it are contained the rain-water reservoirs which underlie the foundations of the houses. The tanks are generally well cemented, but the former are mere deep and narrow trenches, in which the sewerage accumulates from defective structure, want of rain-fall in summer, and insufficient water supply for flushing. The proximity of one to the other is dangerous in the extreme; and leakages from the surface and from the drains into the reservoirs are by no means uncommon. This condition was often observed in many of the infected districts, especially in a portion of the village of Zeitun, where the cholera made sad ravages. There, in several infected houses, the water-tank was situated below the foundation of the house, and had its roof perforated here and there by holes cut through the stone flooring of the passages and courtyard, where offal lay in profusion; while close to and under the very noses of the inmates was the privy, a mere open cloaca in a corner, or even in the kitchen itself. Here surely were the requisite adjuvants for the propagation of the disease, either by drinking water or dejection emanations, and here the cholera struck down its victims and swept off whole families, often entering the very same houses in which the low fever revelled during the preceding summer and autumn.

In Valletta and the more crowded cities a large number of the poorer classes inhabit cellars, the adjoining one often being used as a stable. The crowding is frequently excessive, and sheep, goats, poultry, &c., often divide the room with the human occupants.

Space will not allow further details with reference to the unsanitary condition of Malta and Gozo. Sufficient however has been said to show that, both before and at the time of the outbreak of cholera, there existed all the elements for the growth and propagation of the disease.

Diffusion of the Virus.—The whole body of the Maltese medical practitioners are unanimous in the opinion that, prior to the commencement of July, there was no prevalence in the least degree of bowel-complaints among the civil population, nor until fugitives from Alexandria and the Lazzaretto inmates had diffused themselves over the country. The first undoubted case of cholera among the natives occurred July 1st, at the village of Birchircara, in the person of a whitewasher. This man had been employed two days previously at the Lazzaretto where the disease already existed, and died at his own residence, the case being returned as "gastro-enteritis." On the 3rd July it proved fatal to a woman in Valletta. She was a tailoress, and had received, four days prior to her decease, old clothes as patterns from a merchant's family fourteen days arrived from Alexandria in a vessel with cholera on board. On the 10th July it appeared in a lodging and beer house much frequented by the military, and swept off eight of the inmates, after which it diffused itself over the capital, but keeping chiefly to the low-lying and dirty streets. Gradually the disease spread throughout the whole island, reaching Casal Dingli, the highest point, August 28th. As will be seen, no less than fifty-nine days elapsed between its appearance in the first and last of the villages in such a circumscribed space as the habitable portion of Malta. The disease radiated from the

Quarantine Harbour as a centre in direct ratio with the frequency of communication, and nearness to, or distance from, the capital mattered not except as influencing the amount of intercourse.

In Burmola the first case was recorded on July 10th, and to Dr. Gavino Gulia, who at our suggestion carefully noted the facts, we are indebted for the interesting particulars of the outbreak. On the morning of the 9th July several persons came out of the Lazzaretto and established themselves in Strada Michele, one of the number being the son of the first victim. This latter was a man aged seventy-five, of weakly constitution, he betrayed symptoms of the disease on the evening of the 10th, his daughter on the the 11th, and the other two remaining female members of the family on the 12th. Of these four, two died. On the 14th a man was attacked at Strada Marina, who a few days previously had visited friends in quarantine, a washerwoman, at Strada delie Grogie, who had been in attendance on the first victim, and had received clothes from Alexandrian refugees, and a man at Strada San Marco, whose wife and daughter had also been in frequent communication with the infected family of Strada Michele. These points served as foci for the radiation of the disease, the course of which could be traced in some streets from house to house. In Strada Aquila hardly one family escaped of those that inhabited the "rez de chaussée," the residents of the upper portion of the house generally enjoying an immunity. In Strada Oratorio the disease commenced in the house of a washerwoman who had received clothes contaminated with cholera dejections.

The neighbouring city of Vittoriosa was not affected until the 18th July, and first gave a few sporadic cases. The indications of the disease having obtained a firm footing were first apparent in an ill-conditioned dirty house with eighteen inmates, and followed the arrival of Francesco Farrugia. This man came out of quarantine with "malaise" and other symptoms denoting the presence of some virus in his system. Three days afterwards his son was attacked with cholera, which at the same time became fully developed in the father. No less than eight out of the eighteen inmates fell victims. Dr. Pirotti, the police-physician, and previously a "non-contagionist," states, "that after having studied with care almost every case which has come under my observation, the result is, that nearly each one was consequent upon communication with cholera patients, or with persons who evidently had the virus about them," and that "the most satisfactory results followed the separation of the healthy from the affected."

In the adjacent town of Senglea the outbreak of the disease in the localities chosen by refugees from Alexandria was as apparent as elsewhere, and its too frequent occurrence clearly demonstrated that it was something more than a mere coincidence. At Misida, if the disease was not introduced by infected clothes, it at least proved fatal at the commencement to some washerwomen who had received contaminated bedding from persons dying elsewhere of the malady.

Elevation above the sea-level was no safeguard against bad construction of streets or dwellings, and sanitary defects, and exerted its usual influence upon the progress of the malady in but few instances, and none upon its introduction. In some of the casals the disease showed no tendency to localization, and in the majority it confined itself to the usual fever haunts, and to those portions where the conditions were most favourable for its growth and propagation. Some of the worst streets escaped altogether, others remained exempt for a long time, but on the introduction of the disease clearly showed that the previous immunity was in no wise due to the absence of "localizing causes." The inference to be drawn was this, that whether dirty or clean, well-situated or not, a first case was necessary as a starting point, the subsequent progress depending upon the presence or not of favouring conditions, and the sanitary measures had recourse to. The whole evidence militated most strongly against the idea of a primary* "epidemic constitution."

The Charitable Institutions.—It is worthy of particular notice that the charitable institutions produced few cases during 1865 compared with previous

* As existing at the commencement of the epidemic, in contra-distinction to that which undoubtedly was present at its culmination.

epidemics, in which, as we have shown, they were usually the first affected and always suffered severely. This present immunity is mainly to be ascribed to the improved sanitary condition of the establishments, and in no small degree to the highly enlightened and timely measures adopted by their able comptroller, Mr. Inglott. The hospital for aged and infirm (Ospizio di Vecchi), to which reference was made when describing the progress of the disease among the families of the Royal Artillery in St. Salvatore Counterguard, gave the first indications of the presence of the virus among the inmates on the 1st July, and was, therefore, synchronous with the occurrences in the above-mentioned adjacent quarters, and was succeeded on the 13th by the outbreak in the Florian Barrack on the bastion immediately above. Although every precaution had been taken to avert a repetition of the disasters which had formerly given a notoriety to this institution during previous visitations, the malady made daily progress, and by the 8th September fifty-four attacks and thirty deaths had occurred among the four hundred paupers residing within its walls. Here, as in other low-lying, badly-ventilated, and unhealthy situations, when the disease became localized, we find a marked preponderance of choleraic diarrhœa throughout, as usual culminating with the cholera cases and declining with them.

At the same time it is worthy of note, that not a single case of cholera occurred in the Orphan Asylum, and Hospital for Incurables,* although situated in the vicinity of one of the most infected districts of Valletta. This is no doubt attributable, in the former, to its excellent sanitary condition, and in the latter, which is defective in construction, space, and ventilation, to the stringent sanitary measures had recourse to at the time of the outbreak and during the prevalence of the epidemic, and which seem to have been the main preventatives against the introduction of the virus into this institution. The Lunatic Asylum, situated in an isolated position in the country, a model of its kind with reference to internal sanitary arrangements, escaped also. In these, as in all the civil hospitals, a nutritious diet of animal food was early substituted for the usual meagre soup, salt fish, and olives, on which the inmates subsist; and rigorous attention was enforced in the disposal of infected articles, dejections, and the purification of latrines, &c. Only one nurse, a physician, and priest, were attacked by the disease in the whole of their numerous staff.

Saura Hospital.—As an example of how cholera may be introduced into a community, ripe for the reception of the virus from circumstances of life and unhygienic conditions, we adduce the following, for which we are indebted to Dr. Gouder, medical officer to the institution.

The Saura is a private pauper asylum for the aged and infirm, situated on the edge of the same high plateau upon which Citta Vecchia is built, an airy open site. The rooms and corridors are lofty, and all on the ground-floor. There was no overcrowding before or at the time of the outbreak, and the occupants numbered thirty-seven men and fifty-one women. Free communication by day was allowed between the sexes, and the inmates were occasionally permitted to go into the town where cholera was prevalent, but owing to age and debility this was but little taken advantage of. Opposite the asylum was the civil hospital, in which cases had been constantly treated. Up to the outbreak of the disease, the health of the inmates was perfectly good considering their age and condition, no diarrhœa nor any intestinal derangement prevailed. The only patient admitted into the institution for several weeks before, and subsequent to the 17th August, was a pauper, named Pietro Rosato, who on that day came in from Valletta, where he had been treated by the police-physician during the previous week for "diarrhœa." He fell sick of cholera on the following day, and died on the 22nd. Any communication between this man and the next case, either by personal contact or the dejections, could not be discovered. On the 24th a paralyzed woman was attacked, and after a lull of two days the disease diffused itself indiscriminately among males and females until the 4th September, when it ceased. During that period thirty-

* At the time of the outbreak the former contained 119 children, and the latter 250 patients.

three, including three attendants on cholera patients, were attacked, of whom twenty-five died.*

The privy for the female division was of the most primitive kind, and composed of several round holes in a seat in the centre of a low-roofed outbuilding close to the outer door of the sleeping apartment. There was no drainage, the soil being received into a cloaca. When visited by us during the outbreak, this place presented a most fulsome aspect, and was foul beyond all foulness; and that of the male division also near the sleeping-rooms, although better constructed and capable of being flushed into the pit, was nearly as noisome. Into these all the dejections of the patients were thrown directly, and with the exception of one man and four women (bedridden) all the attacked had been accustomed to frequent the latrines.

The wind, when blowing from the necessary quarter, would waft the effluvia from either latrine throughout the entire building, consequently there was every opportunity for the propagation of the disease by emanations from the dejections decomposing under an almost tropical heat. The main facts however are, that Pietro Rosato introduced the disease, and that its propagation was by means of human intercourse and unhygienic conditions.

The last officially-reported cases of cholera among the civil population in Malta, occurred November 10th at the casals of Tarscien and Zurrico, two in all, and both fatal. The official returns give the attacks as 2327, or 1·9 per cent. of whole population, with a death rate of 62 per cent. This, however, while indicating the number of those who suffered from the disease in its severe form, is no criterion of the actual extent of the virus among the population; inasmuch as the minor cases were for the major part omitted, and no notice is taken of the extensive prevalence of the choleraic diarrhœa in every degree of severity.

The Cholera in the Island of Gozo.—Further corroborating what we have already adduced with respect to the propagation of the disease by human intercourse, is the mode by which it was introduced into this island. The facts are briefly these:—Gozo is separated from Malta by a channel three miles broad. Its inhabitants number about 15,459 souls, and were, before and at the time of the outbreak, in the enjoyment of good health, with no more than the ordinary amount of summer diarrhœa which prevails at the onset of the hot months. A sailor, who had been serving on board a small vessel in the harbour of Valletta, returned to his native village (Xeuchia) on the 21st July with all the symptoms of spasmodic cholera. He was nursed by his two sisters, and two other women who lived in adjoining houses. All of these were attacked on the 24th, and on the 25th another female attendant. Rabbato, the chief town in the island, was infected on the 3rd August after the reception in the civil hospital of cholera cases from Xeuchia, and the last village not until September 8th. The disease progressed throughout the island without respect to isolation or height, and ceased its ravages October 24th, after having attacked 546, or 3·5 per cent of whole population, with a death rate of 47 per cent.

The smallness of this island, the general uniformity of food, dwellings, and conditions of life of its inhabitants, together with the medical attendance being centered in the police-physicians, and the general accuracy of its returns, allow us to bring forth its statistics as a reliable exponent of the influence of the cholera virus upon a community at large. We believe that it would be difficult to produce any example so unquestionable, and consequently we make deductions from the police reports when speaking of the predisposing causes to cholera.

It is notable with reference to the alleged "atmospheric influence" as the main, or only mode of propagation in cholera and allied diseases, that although this island differs not in any physical character or otherwise from Malta, and from being only a few miles distance from the latter under the same general atmospheric variations, yet, strange to say, that in all the terrible epidemics that have desolated these islands, weeks have elapsed before the appearance of the disease in Gozo, the after-results clearly showing that the prior immunity was in no wise due to the absence of conditions favourable to the growth and propagation of zymotic disease.

* During the epidemic of 1837 there was a sudden outbreak of cholera in this asylum, which began, like the present, rather late in the epidemic, and destroyed in twenty-six days thirteen out of twenty-two attacked.

Description of the Disease and its accompanying Conditions.

"*Premonitory Diarrhœa.*"—That cholera is not the necessary accompaniment of an extreme amount of diarrhœa is well known; and, on the other hand, the autumnal months in England of 1853 show, that a decrease of the latter and an increase of the sporadic form are not incompatible. Yet, whenever the one has reached to an epidemic height, a proportionate increase of the other has followed, and this year's experience in Malta is no exception. A comparison of the first five months of 1864 with the same of 1865 shows but little variation in the admissions for diarrhœa, the former being 1·13 per cent. of strength, the latter 1·19. In the month of June, ·57 per cent. were admitted against ·34 of same month of preceding year, the increase being due to the ordinary bilious form in the 84th Regiment lately arrived from England, and is an invariable sequel of the first few months residence in Malta. In the third week of June, a case of "cholera biliosa" occurred in the 100th Regiment, accompanied by somewhat severe symptoms. As all were on the *qui vive*, it excited great attention, but the majority of the Medical Officers pronounced it as merely the summer cholera. The patient subsequently died of cholera spasmodica. It is certain that, prior to the onset of the epidemic, there was no prevalence of bowel-complaints either among the military or civil populations. However, no sooner did the cholera appear, than with it an augmentation of the admissions from diarrhœa, the monthly percentage to strength contrasting strongly against the same periods of the preceding year, until the passing away of the epidemic allowed the equilibrium to be restored. This is well seen in the following Table I, while Table II demonstrates clearly how equably the one kept pace with the other, both with respect to the military, taken as a whole, as to each corps individually in which the disease localized itself, or showed a tendency thereto.

Table I.—Showing the Monthly Percentage of Admissions to Strength from Diarrhœa throughout the Military during 1864 and 1865.

	1864.	1865.
From January to May inclusive ..	1·13	1·19
June	·34	·57
July	·46	2·4
August	·70	3·1
September	·56	3·04
October	·81	·86
November	·70	·85
December	·14	·36

Table II.—Showing the Weekly Admissions from Cholera and Diarrhœa among the Regiments, collectively and individually, during the Epidemic.

Months.	Weeks.	Garrison.		2nd Battalion 4th Regiment.		84th Regiment.		100th Regiment.	
		Cholera.	Diarrhœa.	Cholera.	Diarrhœa.	Cholera.	Diarrhœa.	Cholera.	Diarrhœa.
July	1st	1	10	0	1	0	1	0	0
	2nd	4	33	1	5	0	5	0	1
	3rd	5	39	3	10	0	1	1	4
	4th	23	60	9	10	0	4	10	22
August	1st	13	60	4	11	0	1	5	19
	2nd	9	40	1	9	0	1	2	7
	3rd	13	52	1	9	1	4	3	8
	4th	7	34	2	3	2	7	0	2
September	1st	9	37	0	6	4	5	0	5
	2nd	9	39	0	3	4	2	0	3
	3rd	6	24	1	1	2	5	0	1
	4th	8	29	0	5	8	19	0	0
	5th	5	31	0	1	2	9	0	3
October	1st	1	17	0	2	0	2	0	2
	2nd	1	12	0	0	0	0	0	2
	3rd	1	12	0	0	0	0	0	5

Of the diarrhœa it may be said that there were three varieties met with.

1st. The common ordinary summer diarrhœa, characterised by pains in the stomach, foul coated tongue, and numerous bilious stools, and very tractable in its nature. This was more prevalent than ordinary, and, no doubt, often caused by the irregular habits and drunkenness so rife among the soldiers during the epidemic. That it was also wide-spread among the civil population, the narrow streets and lanes outside the towns and casals fully attested.* It was ascribed by the native practitioners to the more than ordinary consumption of fruit by the poorer classes, bought by them at a very cheap rate, owing to the usual consumers (the better classes) avoiding it most superstitiously as likely to produce the cholera, and substituting it by animal food.

2ndly. There was a diarrhœa not previously existing, characterised by painless watery purging, and often accompanied by vomiting of same character, clean or white furred tongue, depression of the countenance, dark rim under the eyes, and exhaustion. It could be found in every degree of intensity, and, when severe, was classed under "choleraic diarrhœa." Although intractable, it evinced no tendency to pass beyond a certain point, or assume a more malignant form, and was best treated on cholera principles. It was very frequent at the height and during the decline of the epidemic. The 29th and 84th Regiments remarkably well exemplified this form.

3rdly. There was the diarrhœa, an intensification of the second kind, and so completely intractable, that, in 61 cases, where every possible attempt was made to check it, in none did it succeed, but was invariably followed by full development of cholera,—in fact, it was the diarrhœa stage.

Among some Medical Officers, plans were put in action for the detection and checking of the bowel-flux by means of astringent mixtures and pills, easily attainable by the men. Room-to-room visitation by an intelligent corporal or hospital orderly was adopted in the 1st Battalion 22nd Foot, and any man requiring more than two doses was sent at once to hospital. By others but little stress was laid upon this symptom, and more on the general appearance of the person, or the presence of *malaise*. However, the objects aimed at by all were to check minor bowel-complaints, to get any suspicious case as quickly as possible under surveillance, and by attention to the daily numerical applications for medicine, to have an indication of the tendency to health or otherwise of the men.

It must be clearly stated that, during no period of the epidemic was the "premonitory diarrhœa tending towards cholera, but easily checked," met with. The second variety showed no tendency to pass beyond a certain point if not stopped. Its severe form, the third variety, was clearly a stage of the disease; and it may be fairly questioned whether a single case was prevented developing itself into cholera by treatment directed towards suppression of the intestinal flux. It was well to get rid of the first variety, on account of the supposed "predisposition to imbibe the virus shown by persons labouring under bowel-complaints."

Epidemic Constitution.—As the epidemic culminated, it was noted that a malevolent influence was weighing on all communities where the disease existed. It was not present before the epidemic, nor until the disease had obtained a firm hold upon the populace. Uneasiness and coldness at the epigastrium, indigestion, irregular state of the bowels, a great tendency to diarrhœa, flatulence, spasmodic action of the muscles, timidity, darkness under the eyes, and general depression characterised it. It was seen in the poor Maltese women sitting at the door, indolent and careless; in the young, dirty, unclothed urchin playing in the streets; neither the resident nor new-comer, native nor foreigner, were exempt from it; and it was this which led so frequently to the more than ordinary consumption of spirituous liquors. As the epidemic passed away, this followed in its train; but whenever, from local defects, the disease showed any tendency to linger, there also this associating condition presented itself, the occupants of the infected street contrasting strongly with the healthy aspect of the more salubrious quarters from which the enemy had disappeared.

* The houses of the poorer class in Malta are often without any convenience whatever; and, consequently, while the male portion of the family "ease themselves" outside the villages and towns, the younger members make use of the street itself.

The indubitable manner in which this condition, the amount of choleraic diarrhœa and cholera, went hand in hand, both generally and locally, indicated clearly the same cause operating in all, but with different degrees of intensification.

Predisposing Causes.—Independently of the locality of village, street, dwelling, or barrack, we find certain conditions peculiar to the individual or his calling predisposing to the reception of the cholera virus. As usual with other zymotic diseases, those whose body was deteriorated by poverty and its accompanying evils constituted its chief prey. As usual, also, that peculiar inherent susceptibility, quite independent of bodily defects or temperament, "constitutional predisposition," brought some within its fell reach. But, between these two, were other strong influencing causes that we propose to consider as follows:—

1st. A contrast of the attacks of the civil and military populations in Malta shows, that while the former suffered in the proportion of 1·6 per cent., the latter reached 2·9; and that whereas the mortality in the one was at the ratio of 32 per cent. of attacks, in the other it was 7·2; clearly indicating a marked susceptibility on the part of the military not only to fall under the influence of the virus, but also to succumb to it, and this under conditions for maintenance of health far superior to those enjoyed by the native. We cannot but ascribe this to that natural law throughout the whole organic world, viz, a deterioration following the removal from the native clime to one varying from it in any marked degree.

2nd. With respect to sex we find, taking the statistics furnished by the Island of Gozo as illustrating the point, that the female element contributed 3·88 per cent. of attacks, and 48 per cent. of deaths to attacks, against the male proportion of 3·09 and 44 respectively.

3rd. That age acted strongly in influencing both the tendency to fall under the affection as well as to death is demonstrated in the following Table.

	Attacks.			Deaths.		
	Total.	Males.	Females.	Total.	Males.	Females.
	Per cent.			Per cent.		
From Infancy to 25 Years of Age ..	2·37	2·3	2·4	36	28	44
During the Prime of Life (25 to 45 Years)	4·2	3·6	4·7	37	34	39
Advancing Age (45 to 60 Years) ..	4·6	3·2	5·9	59	63	56
Old Age (from 60 upwards)	5·4	5·1	5·6	69	74	64

By this it is apparent that the attacks and deaths increased with increasing age. That, in the former, the female element predominated slightly in youth and old age, but reached its maximum at advanced age; and that, while in the latter, up to 45 years of age, the female constitution predisposed to death, beyond this the balance turned, and the worn-out male succumbed in the greater proportion.

4th. As far as occupation is concerned, the influence it exerts appears to be owing not so much to the employment *per se*, as to the degree it necessitates of remaining in the confined atmosphere of a dwelling, *e.g.*, while those whose employment led them to an out-door existence were attacked in the proportion of 2·8 per cent., the indoor reached 4 per cent., and this holds good of both sexes alike.

5th. Returning to the military, it is seen that the proportion in which the married soldiers were attacked to the single was in the ratio of 4 to 2, the death rate varying but slightly. This marked predisposition among those who are usually considered to be the more favoured portion of the military community, we believe is to be ascribed to their inferior dwellings, poorness of sustenance from selling of ration,* and substituting it by vile native trash, and

* By this he obtains a clear 2*d.* for each ration over the sum he pays to Government; and, as half a ration is given to each child, the amount is not inconsiderable. Unnutritious food and bad spirits substituting the beef and mutton of the duty-man.

to the facility they enjoy of leading undetected an intemperate life, and which undoubtedly is taken advantage of to a great extent.

6th. Still more strongly is the contrast between the soldier officiating as servant to an officer and the duty-man. The return shows that whereas the latter was affected at the ratio of 2 per cent., with 71 death rate, the former reached 8 and 80 respectively. The habits of the servant can only be the reason for this remarkable fact; and we believe that the frequent irregularity of the time and kind of feeding, the free life he leads from increased pay, and the immunity from restraint he enjoys in his wanderings in the native streets, are sufficient to account for the predisposition he so strongly betrayed.

7th. Among the attacked, the well-conducted soldier bore to his intemperate comrade the proportion of 7 to 3. If a reliable account of the actual character of each man could be obtained, and this proportion expressed as a percentage, it is highly probable that the result would be that the sober man ran less risk of contracting the disease than the intemperate; but, let the latter come under the influence of the virus, the chances of his combating it successfully is shown in the fact that, while the alcoholic deterioriated constitution gave way at the ratio of 81, that of the sober only reached 64. When the vice of drunkenness had been carried to such an extent as to produce an appreciable derangement of health, the disease invariably proved fatal.

8th. Among the soldiers' wives we hardly find one that was not in some way predisposed, either by delicacy of constitution, ill-health, intemperance, or labouring under fear or some great mental or bodily depression.

Symptomatology.—As on former occasions, at no period of the epidemic did the disease show any diminution of virulence. From the commencement in June to its termination in November, its murderous character remained unabated. Having once gained an entrance into the system, the symptoms by which it indicated its presence depended upon the quantity of poison imbibed and the resisting capacity of the individual. Provided the latter were great or the dose moderate, the course of the disease was well-marked and uniform; when, however, the contrary was the case, the early symptoms were cut short or even entirely wanting, and collapse quickly ensued. The "so-called" stage of premonitory diarrhœa was present among the military to the extent of 61 per cent. of the affected, with an average duration of 35 hours, the extremes being two hours and five days. Dr. Pirotti, a native practitioner, and who carefully noted, at our suggestion, each case that came to him for treatment, assures us that in none did he find this stage absent; and this may be said to have been the prevailing condition among the native element of the population. But there would appear to be in many cases a period in the disease even anterior to the setting in of the intestinal flux. It was well exemplified in the person of an orderly of the 22nd Regiment, whose disease could be traced developing itself day by day. It was stated by the sufferers themselves, and it was taken advantage of by Mr. Comyn, R.A., in order to get the affected under his control as early as possible. Like the diarrhœa, it was usually absent when the system was suddenly overwhelmed by the virulence of the poison; but when the course of the disease was gradual and uniform, it was generally present. Out of 42 cases carefully noted, it existed clearly and unmistakeably in 27. It was indicative of want of nerve force, and characterised as follows:—a dull and listless appearance of the countenance and eyes, dark rim around orbits, a loss of all activity, anorexia and want of appetite, prostration, vertigo, cramps, increased perspiration, and coldness of surface on the least exertion, thirst, and *malaise*. One patient expressed it "*as feeling so peculiar he thought it was the cholera.*" After this condition had existed during a period ranging from a few hours to two or three days, the diarrhœa ensued, "painless and watery," followed by giddiness, dimness of sight, ringing in the ears, "staggering like a drunken man," and inability to control voluntary movements. When the cramps, vomiting, and profuse intestinal flux had supervened, the disease was said to be present.

As usual, some were struck down with but slight warning, and, after a few vomits and stools, passed quickly into collapse, and died within a few hours completely overwhelmed by the virus; but the major part were more prolonged. When the patient merely verged on collapse, he did well; but when the collapse was complete the recoveries were very few. Contrary to the

statement of Magendie, all those in whom the pulse was completely obliterated at the worst did not die. There were many in whom thes ymptoms were slight, and of these the major part do not appear in the returns but were included under the head of diarrhœa or choleraic diarrhœa in order n ot to alarm the community by the extent of the disease among the populace,* thus giving a percentage of mortality to attacks greater than the true state of affairs warrants, and raising the diarrhœa list to an undeserved valuation and importance.

The sensations experienced at the epigastrium varied greatly. Sometimes there was merely uneasiness, at others a stabbing or cutting pain, now an intense burning, then an oppression as of great weight, occasionally a feeling as "though it would burst;" but in all there was the complaint of intense internal heat that constantly demanded water for its mitigation, bearing no ratio to temperature of external surface, but diametrically the opposite; the coldest quickest collapse producing it in the greatest intensity. It followed the virulence of the poison point for point, and the restlessness and demand for fresh air went hand in hand with it.

The aspect of the eye varied greatly, as is well shown by the following extracts from the notes of individual cases:—"bloodshot and watery;" pupils contracted, eyes remaining bright to the last;" "eye expressionless and dull, cornea flaccid and milky, pupils dilated;" "eyes listless, pupils varying, occasionally intense anxiety depicted in them." Sometimes nothing beyond a depressed appearance was noticed, and the only rule to be deduced was, that the cases terminating in a few hours were accompanied by a dull milky state of the cornea and dilated pupils.

Although the legs and arms were the seats of the greatest intensification of the cramp, yet no part of the voluntary muscular system seemed free. The intermitting abdominal pain pointed more to spasmodic action as its cause than any griping or irregular action of the intestines, and bore no proportion to the frequency of the stools; the constant hiccough seemed in many cases to indicate a like cause; the retraction of the eyes, the extent of the facial distortion, and the diminution of the voice, went *pari passu* with the spasm elsewhere, and all were in unison with the severity of the disease. As the collapse became more confirmed the spasms decreased.

A careful observation of the cases falling under our charge during the epidemic does not warrant the general opinion with respect to the universal suppression of the urinary secretion. Thus, out of nineteen cases total suppression ensued in eleven, being at the ratio of fifty-six per cent.; in four, at no period of the disease was this secretion absent; and in four it was apparent up to the setting in of collapse, was suppressed during this period, but immediately returned on reaction. It was noticed also that in those cases where suppression was present, and the duration of the disease extended, the peculiar cholerous odour reached its acme; while, on the other hand, it could not be discerned where only slight interference with the urinary reaction took place; leading clearly to the idea of a relation of cause and effect. In those cases where the urine could be collected, whether passed before, during, or after collapse, the variation from the normal standard consisted in a diminution of the watery parts, and consequently a relative excess of the acid, colouring matter, and nitrogenous principles.

Vomiting and purging were always present, and of the characteristic appearance; the reaction of the former was usually acid, the latter alkaline. The extent of the collapse was in no way commensurate with the amount of discharges. Invariably it was found that the more severe the disease the less was the frequency and quantity of these ejections; an excessive amount of vomiting in the early stages was a favourable symptom; and in the fatal cases, extending over a comparatively lengthened period, a suppression of the vomiting, and an unconsciously passing away of stools (consisting of the unaltered fluids taken in by the mouth a few minutes previously) marked the termination. The faintest indication of bile in the stools indicated well.

* This system was pursued both among the civil and military,—certainly a questionable proceeding when the community require to be aroused to a proper appreciation of the extent of the danger.

The extent of blueness of the skin and of the lips appeared to depend upon the severity of the disease. It was present before collapse set in, and increased as this state became prolonged. Of course it was varied somewhat by the natural cutaneous hue and temperament.

The sodden puckered condition of the skin generally followed in degree the amount of the excretion by the intestinal tract, and depended apparently upon the diminished contents of the capillaries. Sometimes, however, it was present before this could result, and the quickness with which it disappeared on the setting in of recovery negatived this as the only cause. No doubt the production of it was assisted by the constant bathing of the skin by the intense perspiration of neutral reaction which marked the majority of the cases.

When the disease attacked children the symptoms were not so clearly portrayed as in the adult, but partook more of choleraic diarrhœa, and under this head many of the cases were classed whether terminating fatally or not.

Great restlessness and quickened respiration marked the termination of many cases. Sometimes just preceding dissolution the whole energy of the individual appeared to concentrate itself for one last attempt,—a struggle, a fall back, and then death. In others, the gradual passing away from life to death was such that it was difficult to say when the one ended and the other began. In but few cases did consciousness last to the end. From the very first the perception and sensations were dulled; it was only by an effort that the patient could concentrate his attention to the subject in hand; when addressed, he startled; indifference to the result, and complaints only when the suffering was extreme marked the majority, while towards death so complete an exhaustion of the brain supervened as often to simulate insensibility.

The average duration of the fatal cases equalled twenty-nine hours, the extremes four and one hundred and twenty. This period, however, is comprised between the full development of the cholera symptoms and the termination of the case, leaving entirely out of calculation the diarrhœa stage. That this gives a false idea of the duration of the disease there can be no doubt, but so long as the diarrhœa continues to be called "premonitory," and not a period of the disease itself towards full development, one is justified in calculating it as above.

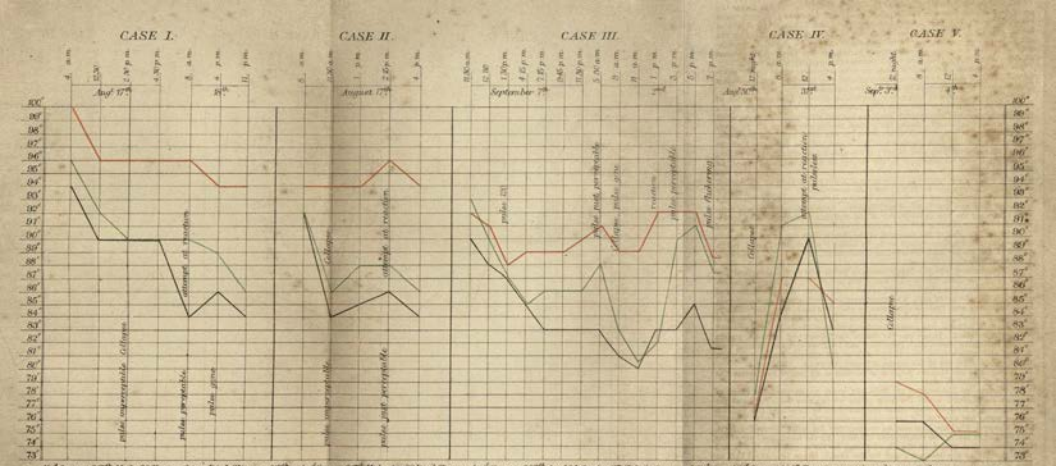
When recovery was the happy result, a quick convalescence marked the majority of the cases, but in some few it was prolonged; the average duration being eleven days, and the extremes four and twenty-four. A marked absence of secondary lesions was the rule. A too great reaction was occasionally encountered; secondary fever with typhoid symptoms in only four cases among the military, but more frequent among the civil population. In the case of the 1st Battalion 22nd Foot, in which it was present, the temperature of the body never regained its normal standard. In one case the disease was followed by dementia, and in two by congestive pneumonia. Pregnancy and lactation were complicating conditions, and seldom failed to assist towards an unfavourable result, even when the degree of virulence of the disease indicated otherwise.

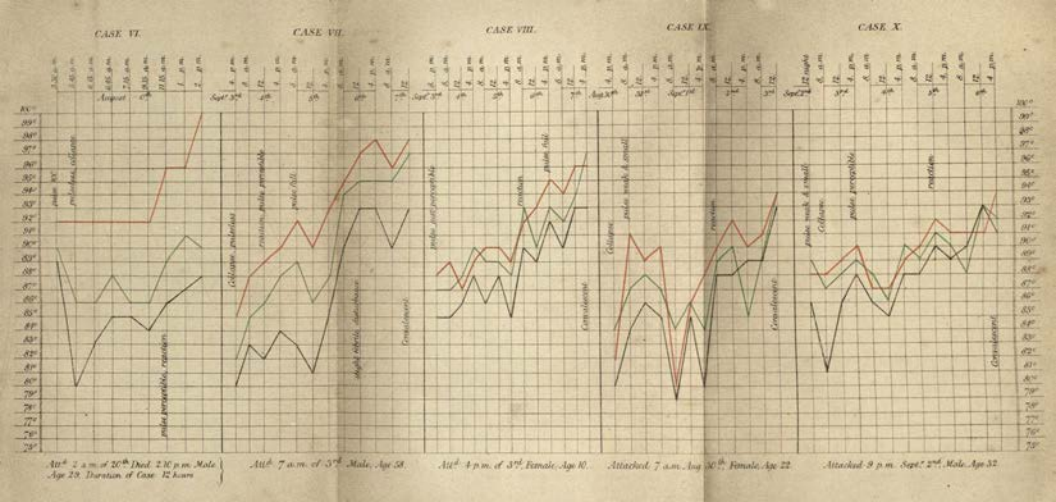
It cannot be said that the presence of cholera at all tended to increase the mortality of other diseases.

Variations of Temperature of Body.—In order to ascertain the range of temperature through which the body passes while under the influence of the cholera virus, a series of observations was instituted by us among the patients coming under our care; and at our suggestion among the natives by Dr. Portelli, Civil Hospital, Floriana, to whom we are indebted for many interesting facts. The method of taking the observations was this: for the hands, the bulb of the thermometer was placed in the closed palm; for the epigastrium, it was laid upon the pit of the stomach; and for the breath, it was held about half an inch in front of the separated lips. The accompanying chart demonstrates the variation of temperature in thirteen cases taken indiscriminately, eight of which proved fatal; and for the purpose of estimating them fully a short abstract of each is added.

Case 1. Was a large well-developed soldier, sanguineous temperament, and of drunken habits. The attack was of moderate severity, there was no stamina to withstand the poison, and the unfaltering downward course is well exemplified.

Case 2. A hard-working orderly, previously intemperate, but latterly moderate. Constitution worn out, system quickly succumbed.


CASE I.
CASE II.
CASE III.
CASE IV.
CASE V.
Aug. 17th
18th
August 17th
September 7th
Aug. 30th
Sept. 3rd
pulse imperceptible
Collapse
pulse perceptible
pulse gone
attempt at reaction
pulse just perceptible
pulse fluttering
pulse 121
pulse just perceptible
pulse gone
reaction
pulse perceptible
pulse fluttering
Collapse
attempt at reaction
pulsless
Collapse
Att.d 2 a.m. of 17th Male 33 Years of Age. Died 6½ a.m. of 19th
Duration 52¾ hours No rise of temperature after death
Att.d 6 a.m. of 17th Male Age 33 Died 6½ a.m.
Duration 12½ hours Rise after death
Att.d 11 p.m. of 37th Aug.t Male Age 27. Died 8 p.m. of 2nd
Duration 45 hrs No rise of temperature after death
Att.d 9 p.m. of 30th Female age 52
Died 8 p.m. of 31st 23hrs duration
Att.d 7 p.m. 3rd Female Age 66
Died 7 p.m. of 4th 24 hrs duration


CASE VI.
CASE VII.
CASE VIII.
CASE IX.
CASE X.
August
Sept.r 3d
Aug.t 30th
Sept.r 2d
Sept.r 1st
Aug.t 31st
Aug.t 30th
Sept.r 2d
Sept.r 3d
Sept.r 2d
Sept.r 3d
Sept.r 4th
Sept.r 5th
Sept.r 6th
Sept.r 7th
Sept.r 8th
Sept.r 9th
Sept.r 10th
Sept.r 11th
Sept.r 12th
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Sept.r 16th
Sept.r 17th
Sept.r 18th
Sept.r 19th
Sept.r 20th
Sept.r 21st
Sept.r 22d
Sept.r 23d
Sept.r 24th
Sept.r 25th
Sept.r 26th
Sept.r 27th
Sept.r 28th
Sept.r 29th
Sept.r 30th
Oct.r 1st
Oct.r 2d
Oct.r 3d
Oct.r 4th
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Oct.r 10th
Oct.r 11th
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Oct.r 15th
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Oct.r 17th
Oct.r 18th
Oct.r 19th
Oct.r 20th
Oct.r 21st
Oct.r 22d
Oct.r 23d
Oct.r 24th
Oct.r 25th
Oct.r 26th
Oct.r 27th
Oct.r 28th
Oct.r 29th
Oct.r 30th
Oct.r 31st
Nov.r 1st
Nov.r 2d
Nov.r 3d
Nov.r 4th
Nov.r 5th
Nov.r 6th
Nov.r 7th
Nov.r 8th
Nov.r 9th
Nov.r 10th
Nov.r 11th
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Nov.r 25th
Nov.r 26th
Nov.r 27th
Nov.r 28th
Nov.r 29th
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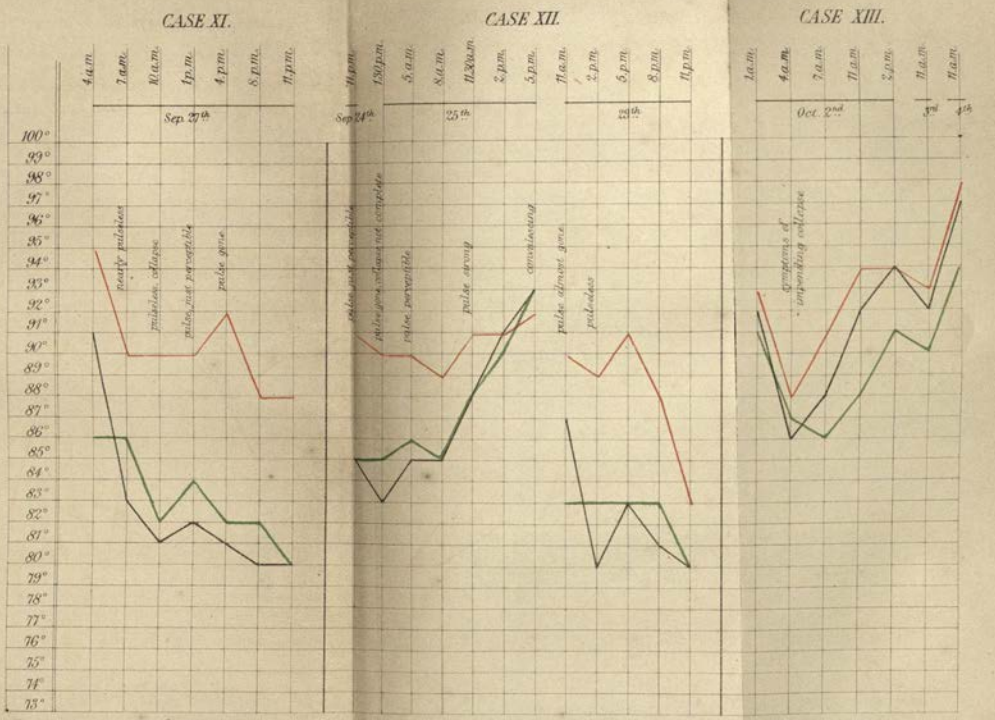
CHART SHEWING THE RANGE OF TEMPERATURE OF BODY DURING CHOLERA ATTACK (FAHRENHEIT)

RED LINE INDICATES THE EPIGASTRIUM; THE GREEN THE BREATH; THE BLACK THE HANDS.



Att: 3 a.m. of 27th. Male, 37 years of age.
Died 3 a.m. of 28th. Duration 24 hrs.

Att: 9.30 p.m. of 24th. Male. Age 28. Duration of Case 5 days. Death 12 p.m. of 29th.

Att: noon Oct. 1st. Male Age 35. Duration of case Days.

Day & Son, Lithrs. to the Queen.

Case 3. A fine, young, well-constitutioned soldier, but of somewhat intemperate habits. The system battled well against the disease; the fall into collapse most marked; the reaction as much so, while the subsequent rapid downward course towards death proved the complete exhaustion of the vital powers. His previous habits told sorely against him.

Cases 4 and 5. Were two elderly Maltese females. The former is interesting from the strange fluctuation of temperature,—the great rise, the four hours' stability, and the rapid downfall. The latter from the extreme lowness of thermometer reached. In both the primary fall from normal temperature into collapse must have been very great and rapid, but probably in each the lowness at admission into hospital was due partly to other causes than the disease.

Case 6. A very delicate light-haired soldier of temperate habits, disease severe; the reaction very marked, and death ensued independently of the disease.*

Case 7. A somewhat aged Maltese man, temperate, and thorough hardy constitution. The disease severe; the upward course from collapse to full health with only one fluctuation is well shown, as well as the advantages of a hardy constitution and temperate mode of life in counteracting the defects of age and virulence of the poison.

Case 8. A young healthy Maltese girl. Complete collapse was never reached in this case. The undulations of the thermometer during the worst of the disease and recovery is fully exemplified, as well as in—

Cases 9 and 10. Healthy young Maltese, female and male respectively. They speak for themselves.

Case 11. Was a married soldier servant, irregular previously, but still somewhat addicted to drink since. His appearance indicated an age greater than his years warranted. Disease severe and rapid.

Case 12. Fine healthy soldier, slightly intemperate. Dose of poison moderate. He was apparently soon convalescent, but relapsed with great congestion of the lungs, to which he quickly succumbed.

Case 13. Severe choleraic diarrhœa in an extremely drunken fellow. The notable features in these cases are, the lowness of temperature reached, and the febrile disturbance which characterized the reaction. The latter no doubt explains the manner in which the hands, although accompanying the variation of the breath, yet asserted a superiority of temperature immediately after having arrived at the lowest point.

For the purpose of deduction the most important observations are those relating to the breath; inasmuch as, that while many external conditions, such as the air, clothes, posture, and applications, may influence the readings of the hands and epigastrium, those of the respiration must be a true indication of the internal economy, and consequently of the progress of the disease. Upon this hypothesis the following propositions are based from a careful study of these cases, assisted by other observations not sufficiently extensive and perfect to place them upon the chart.

1st. That a strongly-marked, rapid downfall from the average normal temperature 97°, takes place soon after the setting in of the cholera symptoms, and the extent in proportion to the dose of the poison; the downfall being characterized in the healthy young, and up to middle age, by elevations and depressions, each succeeding one of the latter reaching a lower point than the preceding one; in the aged, weak, or debauched constitution by an uninterrupted sinking of the thermometer. The average fall from normal temperature into collapse was 11°, the extremes 7° and 15°.

2nd. That the highest temperature at which the general symptoms of collapse became apparent was 90°, the lowest 82°, the average 86°.

3rd. That during the period of collapse, the temperature underwent but slight variations in the aged, weak, or debauched; while in the young, and up to middle age, it was characterised by undulations.

4th. That the stage of complete collapse is not marked by any characteristic unvarying point of temperature. It would seem that an excessive dose of the poison is accompanied by a corresponding loss of heat; but when the vital stamina is deteriorated by drunken habits or delicacy of constitution, either the

* Vide treatment by strychnine.

general symptoms of collapse are present when the thermometer makes no great fall, or an excessive lowness is reached with no corresponding general indications, *e.g.*, Cases 1, 2, 6, and 13; while, on the other hand, a hardy well-used constitution does not betray signs of failing until the respiratory function is much interfered with. The lowest point reached during life was 73°.

5th. That a general brightening up of the patient, unaccompanied by any change of temperature, often preceded the final downfall, and was exceedingly deceptive until appreciated rightly.

6th. That the general signs of reaction were preceded by a marked elevation of the temperature, and when convalescence ensued this reaction was characterized by fluctuations tending towards reinstation of normal temperature. The average rise from complete collapse into full reaction was 6°, the extremes 8° and 4°.

7th. That when death ensued, whether preceded by reaction or not, the fall of the thermometer was most marked and rapid.

8th. That after death a rise of temperature ensued in the cases of great severity and quickness of course; but when the disease was prolonged, the patient falling into that senseless condition, well expressed as "death in life," the contrary was the rule."*

9th. The readings of the hands and epigastrium followed the breath's variations, though not always in the same ratio. As will be seen, the epigastrium especially showed a great tardiness in assimilating itself to the others, and was very tenacious of its heat.

Thus, the thermometer indicated that in the aged and delicate the vital powers gave in to the poison, step by step, commensurate with the dose; collapse reached, a comparative quietness ensued, followed by the system asserting its superiority, or succumbing rapidly. The course from the onset to the termination was gradual, with no marked deviations. Not so, however, with the young and healthy. Although the system was compelled to give way to the attacks of the virus, it was not without a struggle; the collapse was marked by constant attempts at reaction, and this having once set in, the vital powers seemed to overreach themselves in their eagerness to resume their normal condition.

As helps to prognosis it may be said, that a rapid and marked fall at the onset, a temperature below 86°, a further loss of heat during collapse, a setting in of general symptoms of reaction not preceded by rise of temperature of breath and hands, each and individually indicated badly; but it must be borne in mind that the previous habits of life were great influencing causes, and this more especially when drunkenness was the deteriorating agent. This vice, *per se*, appeared to predispose to the disease, but no words can express its baneful effects as demonstrated by the manner in which its devotees succumbed to the poison, even when in a minor state of intensity.

Pathology.—That the cause of this severe disease is an organic poison absorbed through the medium of one or more of the mucous surfaces brought into contact with external agencies, and reproducing itself in the human body, there can be but little doubt. From all the well-authenticated cases we have been able to collect, the average interval between the exposure to the poison and the onset of the symptoms was 3·4 days, and ranging from 24 hours to 6 days. A previous attack does not guarantee against its recurrence in the future.† Like all the specific animal poisons, it has its period of incubation and activity, as well as its mode of elimination; yet its rapid course, and the comparative absence of secondary lesions, characterise it strongly from all others. Also, although resembling somewhat the "cold style" of marsh fever, it is widely separated by the general want of anything approaching the "hot and perspiratory stage," and the periodical returns. The whole course of the disease points to a venomous material in the system, impeding the normal respiratory process and interchange between the blood tissues and organs, and consequently leading to an increasing tardiness of motion in the capillaries, an

* This is not peculiar to cholera, but has been noticed in other diseases in which a rapid death supervened.

† One poor fellow succumbed who had previously suffered from it at Gibraltar, and one convalesced for the third time.

abeyance to a greater or less extent of function and secretion, and progressive exhaustion; the system either quickly succumbing, or rising superior to the "materies morbi," which finds its exit chiefly by the intestinal canal. After the contamination of the blood, the brain was the first organ to show its aberrance from the normal state, as evinced by the listlessness, want of energy, and general depression which characterised even the minor cases of choleraic diarrhœa. In these the dose of the poison was small, the process of expulsion soon commenced, and convalescence quickly ensued. When, however, the poison was in a greater state of intensification, it revealed itself by the increasing non-oxidation of the blood and loss of temperature, blueness of the skin and mucous membranes, and rapidly progressing depression. Gradually each organ in its turn became involved as the poison assumed more and more an ascendancy, until no part of the body could be said to be free from its influence. It was difficult to say whether the functions of organic or animal life were the more in abeyance, or whether the spinal chord suffered less than any other portion of the nervous system. On the one hand reflex action was not augmented, but rather the contrary; on the other the influence of the will in restraining the cramps was totally suspended. As usual, the discharges from the stomach and intestines were great, and tended further to prostrate the patient; but in those unhappy cases where the dose of the virus was overwhelming, these from the first were reduced to a minimum, the vital powers were quickly sapped, an exhaustion of the brain amounting almost to insensibility ensued, followed by gradual suspension of all the functions and death. The majority, however, were more prolonged, and generally accompanied by reaction from collapse. Should the system be unable to sustain the process, the downward course was rapid: increasing exhaustion of the nervous system and loss of temperature, profuse unrestrained stools from relaxation of the sphincters, and death. When, however, the reaction was followed by convalescence, the first change was observable in the respiratory process, as evinced by rise of temperature of breath, followed by a gradual reinstation of all the secretions. The extreme exhaustion of the body generally, and of the brain in particular, was shown by the deep sleep into which the patient fell; the absence of any marked change in the tissues by the return of normal secretion, the quick convalescence of the majority, and general absence of secondary fever; the great loss of weight in so short a time, and the slowness to regain it in a few, pointed out how sharp had been the struggle; the quickness with which the respiratory process was renewed indicated no great deterioration of the structure of the blood corpuscles; while the slowness of disappearance of the dark rim around the orbit, and dusky hue of the skin, pointed out the blood as the last to recover itself, as it had also been the first to become involved. It seems essentially a blood poison; its primary action is evidently upon the corpuscles, preventing the normal interchange between them and the oxygen of the air,* consequently diminishing the heat of the body; and secondarily upon the tissues and organs, interfering with their nutrition and secretion, and leading to further contamination of the blood, and gradual annihilation of all those processes the performance of which is essentially necessary for the continuation of the vital power. The exit of the "materies morbi" is chiefly by the intestinal tract. It commences early in the disease, and extends apparently into convalescence; but unfortunately too often the stamina of the patient is not sufficient to support the profuse drain, and succumb in the attempt.

Little can be said of the morbid anatomy, inasmuch as the quickness with which the bodies were disposed of gave no time for carrying out any careful examination. In the few cases in which post-mortems were made, the conditions met with were the same as noticed in previous epidemics in India, &c.

* That the prevention of interchange between the corpuscles and oxygen of the air is not due to the draining away of the serous portion of the blood, but directly and primarily the influence of the virus, is evident, by its presence from the first, before any great amount of diarrhœa has ensued, and by its greatest intensity in those severe cases where the virus is at its maximum, and the discharges at the minimum. The same facts oppose the theory of the late Dr. Snow. The loss of temperature, the blueness of skin, and collapse, were in no way commensurate with the intestinal flux.

Treatment.—When the cases at the Plague Hospital placed it beyond a doubt that cholera had appeared in the island, his Excellency Lieutenant-General Sir H. Storks, on the suggestion of Dr. Clark, 84th Regiment, Senior Medical Officer on the station, lost no time in enjoining the attention of commanding officers of corps to the following precautionary measures: viz., strict attention to cleanliness in and around barracks, lime and charcoal to be freely used, bedding to be aired daily, coffee for the working parties employed before the breakfast meal, whitewashing of the barrack-rooms, immediate issue of cholera belts, all cases of diarrhœa to apply for medicines, avoidance of districts infected with cholera, of unripe fruit, and all unnecessary exposure to midday sun, and strict attention to flushing and disinfecting of barrack latrines.

Instructions were also given that the bedding of any of the military contracting the disease should be immediately destroyed,* partly to prevent communication to others by any contaminations from dejections, &c., and also on account of the refusal of the Maltese to wash the infected articles. The same was also carried out after the termination of the case. How far such an extreme measure is necessary is questionable. Early in the epidemic cases were noted that placed beyond a doubt the capability of communicating the disease from one to the other, and to guard against this the order was given. Should such a contingency arise, that owing to the number of cases proper disinfection of the bedding and clothing could not be carried out, no better plan could be devised than destruction by fire; but under ordinary circumstances, free exposure for two or three days to a current of fresh air, and steeping in water mingled with a disinfectant, seem to us all that is necessary.

The cases among the military were sent to the regimental hospitals generally; sometimes they were treated in tents. The available spots for the civil population were either their own houses or the central hospitals at Floriana, Rabbato, and Gozo. On arrival the patient was placed either in a ward set apart, or he occupied a bed indiscriminately among the rest, according to the option of the medical officer, and the space at disposal. The dejections were mingled immediately after being passed with a quantity of previously prepared disinfecting solution, and no time was lost in throwing them either into the ordinary latrine or in one set apart for the purpose, or buried. Disinfectants were freely used in the wards, and as much fresh air obtained as possible. The same system was carried out in the civil hospitals, and all the institutions over which Government had control, by a well-devised series of sanitary rules set in operation by Mr. Inglott, the Comptroller of Charities. How far any such precaution was taken among the poor in their own homes is not known, but certainly not to the extent that the occasion demanded.

As the returns show, the mortality was exceedingly great in proportion to attacks,† and often the disease ran its course uninfluenced in the least degree by the best directed measures to arrest it. The cases of choleraic diarrhœa did very well by attention to the general comfort of the patient, and meeting symptoms as they arose. A very satisfactory plan of treatment was found to be the administering of an emetic, followed by a sedative dose of calomel and opium; and in nine cases out of ten nothing further of a medicinal nature was required. Of the slight cases of cholera the same treatment applies; but of the severe forms, so virulent and intense was often the dose of the virus that neither the patient nor the surgeon had any chance of combating it. The general opinion was that attempts to cure were "heartrending," and system after system failed. In some cases, and especially among the children, the "cholera drops of the Field Companion," or a mixture allied to it in its components, were productive of good. The saline method held out no hope of saving and was quickly abandoned. At one moment some one medicine or plan of treatment would give hopes by a successful case, but succeeding fatal ones showed how little the recovery was in any way due to the physic. The Pharmacopœia and medicine stores were well foraged, but to no good end. Chlorate of potash, astringents, ipecacuanha, calomel, antispasmodics, aromatic oils, chloroform, chlorodyne, acidulated draughts, anodynes, cannabis Indica, &c.; all had their turn, and probably alleviated the sufferings. Seeing the recoveries follow some-

* This was rescinded towards the middle of August.

† As we have before stated, this is not a fair deduction, inasmuch as the slighter cases were often returned as diarrhœa.

what in proportion to free vomiting, emetics were used especially at the onset of the disease, and when the patient had stamina to bear up against the poison, and an undeteriorated constitution, they undoubtedly assisted towards a favourable issue. Stimulants were freely administered in varied form and manner. Iced lemonade was at hand to assuage the intense thirst, and to obtain quietude of the stomach and intestines counter-irritants were applied; while the cramps were assuaged by hot water, medicated solutions, and hand-rubbing. A favourite mode of administering nutriment was the frequent employment of small injections of beef tea, port wine, and arrowroot; and with some it was persisted in whether the patient was able to retain them or not. There was no lack of energy on the part of surgeon nor orderly, and their perseverance deserved a better result. The system generally pursued in the cases falling under our charge was this:—After placing the patient in bed, in a large well-aired ward apart from the rest of the sick, an emetic was given, followed by calomel gr. x. and opium gr. ij. The effect of the emetic and accompanying straining was thoroughly to clear out the stomach and intestines of all their contents; the sedative influence of the calomel and opium came into play immediately afterwards; and the combination resulted invariably in a quietude of the stomach for a longer or shorter time, during which the patient was able to retain any medicine or nutriment administered. Our after treatment consisted chiefly in attending to the comfort of the patient, alleviating the cramps, and assuaging the thirst by drinks of diluted brandy and cold lemonade. Should the vomiting and purging continue, a further emetic did not seem advisable. The recoveries with us were sufficiently few, but it may be said with confidence, that even if no permanent good resulted from the administration of the emetic, certainly no harm was done; temporary alleviation was invariable. Perhaps the plan that holds out the greatest chance for the patient consists in an emetic in the first place,* and subsequently supporting the system by stimulants and liquid nutriment—by the stomach, if not impracticable from vomiting, and by enemata.

It may be stated, that the experience of the epidemic tends to the inference that no known system of treatment hitherto adopted has but the slightest pretensions towards cure, and that when an individual is under the influence of a severe dose of the poison, it rests more with stamina of constitution than with medicine as to the result. The high rate of mortality among the affected is to be ascribed not to deficiency of medical skill or careful attention, for nothing was wanting of the latter among the military, but rather to the character of the disease, which was unanimously declared by all, who had had previous experience elsewhere, to have been of the most virulent form.

But before terminating this heading it is necessary to say a few words on the results obtained by the administration of strychnine, and application of ice to the spine. The former was given consequent upon a report from Dr. Hensman, 2nd Battalion 20th Regiment,† in which the beneficial effects, "even when complete collapse was present and the case looked upon as hopeless," were put forth in a very strong light. In three cases of the 22nd Regiment it was given, and in one of the Royal Artillery, 29th and 84th Regiments. The directions were adhered to, the dose ¼ gr. In the case of the Royal Artillery three doses were given, one every quarter-hour; the specific effects of the medicine appeared, and death quickly followed, leaving no doubt as to the direct cause. In two cases of the 22nd Regiment, gr. iss and gr. j, respectively brought the system under its influence with no beneficial results, nor retarding the fatal termination. In the other case it was administered during collapse (and in this respect alike all the rest) to the extent gr. j, without results; it was stopped, and substituted by cannabis Indica; reaction ensued, and with it absorption of contents of the stomach; tetanic spasms followed, and caused death when the indications were of the most favourable kind, as is well-exemplified in the Chart of Temperature, Case 6. The case of the 29th Regiment terminated fatally, the 84th recovered, yet the surgeon of the Regiment did not pursue the treatment subsequently. Such knowledge, so dearly bought, effectively put a stop to its further use among the military.

* Of course this does not apply when the patient is collapsed before being seen.
† Vide Army Medical Blue Book for 1863.

What influence it might have if administered in smaller doses, and especially during the earlier periods of the disease, is doubtful as no one chose to hazard the experiment.* With respect to the application of ice to the spine it was adopted in three cases, all fatal. Its influence on the course of the disease was *nil*, and we cannot but think that in one case in which congestive pneumonia succeeded it acted deleteriously. We speak hesitatingly of this latter plan of treatment, but of the former we cannot but strongly urge its non-adoption in the dose stated and during collapse.

Concerning the treatment in vogue among the civil practitioners it may be said to have been of the mildest character, leaving the patient very much to his chance. Emetics were occasionally used and also mercury, stimulants never, castor oil treatment by a few.

Happily, where medicine is at such a deficiency in opposing the baneful effects of so virulent a disease sanitary service more than counterbalances it, and demonstrates indubitably the method of prevention.

Influence of the Atmosphere upon the Progress of the Epidemic.

A comparison of the last six months of 1865 with the same of the preceding year, indicates that the former differed from the latter in an excess of ozone, the daily average being 4·5 against 4·2; a diminished rainfall, 14·92 inches against 20·64, and a prevalence of S.E. and S.W. winds during the last two months; the barometer and thermometer varying only in the slightest degree. As the cholera had almost disappeared at the commencement of November, and as the fall of rain is always very small prior to this month, so we must exclude any deduction from the diminshed rainfall, and the prevalence of the S.E. and S.W. winds. That which calls for especial mention is the excess of ozone. It is utterly impossible to connect this epidemic with any appreciable condition of atmosphere, and a careful study of the daily variations of the meteorology in each particular, and a comparison of the fluctuations of the cholera chart fully corroborates it. It will be noted that a rise in the number of the attacks occurred after the first rainfall, that the termination of the epidemic was coincident with the full setting in of the rainy season, and that the amount of ozone in the general atmosphere was not in an inverted proportion to the cholera virus.†

The epidemic taken as a whole was made up of local outbreaks, each characterised by the appearance of a first case,—a lull,—a reappearance in augmented proportions, the disease gaining in force with each successive attack,—a culmination, when an "epidemic constitution" might be said to have prevailed, and when the disease had got within its grasp all those susceptible to the virus,—a decline.

The diffusion over such a lengthened period of the local outbreaks of the epidemic in the Mediterranean; the disappearance of the disease in some countries at midsummer, and its appearance in others towards the commencement of winter; the antipathy that cholera betrays towards the upper temperate and arctic zones, and its constant activity in the tropics; the clear evidence that a cold winter will not necessarily stop its ravages; the manner in which it has sometimes lulled during the cold months, breaking out into activity with the increasing heat; the nipping in the bud of one epidemic by the approaching cold weather, the severity of the cases occurring indicating no diminution of power in the virus, and the rapid extinction of a declining one by the same; all these appear to offer an inexplicable enigma. Yet this seeming chaos falls into something like order when we consider, that while great variations of temperature exercise no influence upon the virus itself nor upon its introduction, and but in a secondary manner when the epidemic is on the wane, yet that undoubtedly great heat is a promoting agency during its progress, and cold a

* This is not the first time strychnine has been employed in cholera. In the "London Medical and Surgical Journal," for August 10, 1833, is an account of a number of cases of cholera cured by a Mr. Jenkins, Prescott Street, by administering strychnine in the first stage. The editor sums up in these words, "We are convinced that it fails in the last stage of the disease, as all remedies hitherto employed have done. Its discontinuance proves its failure."

† The extent to which the one influenced the other in the cholera haunts is not known. No observations were made.

deterrent. The effects of thermometric variations appear to be limited to the conditions that foster the diffusion of the virus. It is well known that its propagation is in the greatest degree where the circumstances favourable to decomposition are at an acme; this process seems essentially necessary for the setting free of the poison from the excretions that act as the vehicle of its expulsion from the body, and consequently all those meteorological conditions that favour it, act as adjuvants to the dissemination of the virus, and *vice versâ*. This seems to be a rational and the only explanation that the data will allow of.

Propagation of the Disease.

That the cholera was introduced into Malta and Gozo by means of infected persons and ships we consider undeniable. At the Plague Hospital where all the conditions were favourable for the reception of the virus, and with the poison in the Lazzaretto and in the ships anchored in the immediate vicinity, did the epidemic first declare itself. Of course, it is difficult to trace the immediate links of its subsequent progress; but we think that sufficient has been adduced to convince any unprejudiced mind that human intercourse was the chief method of its diffusion throughout the country.

It is taking a telescopic view of the subject after epidemics have passed and gone, to reason with statistics on the one hand and a map of the region on the other, and therefore argue that as the disease swept across a continent it was propagated by the atmosphere alone, thus taking into consideration only a few points in laying down principles that needs must have extensive ramifications. To accurately comprehend all the details of an epidemic, the data must be carefully enquired into and noted down as they occur; for most assuredly if they are allowed to stand by until the disease has disappeared, there will be few points that will admit of a satisfactory solution. As in all subjects of scientific enquiry, preconceived opinions and prejudices must give way to the solid deductions of accurate and close observation of all the phenomena connected with the matter in hand.

Looking more minutely into the facts furnished by this epidemic we are warranted in asserting that cholera may be communicated in the following modes:—

1st. By the atmosphere loaded with the virus emanating from the bodies of those affected by cholera or choleraic diarrhœa, through the medium of the ejections, dejections, respiration, and perspiration. The symptomatology, pathology, and morbid anatomy, indicate that no portion of the body is free from the influence of the poison, and it is only rational to suppose that all the excretions participate, though undoubtedly in varying degrees. Among the military no less than 13 were attacked by cholera while in hospital with other complaints, and no less than 15 who officiated as nurses, and in whom the disease followed so quickly as to lead undoubtedly to the inference of infection from the sick one.

We have several well-attested records of persons becoming affected with diarrhœa and vomiting on visiting infected places and persons. As an illustration we quote the following:—Mr. Comyn, R.A., mentions a family living in great destitution in a wretched and exceedingly bad-ventilated apartment in which some of the members had died of cholera. The stench was unbearable, and although the clergyman and himself were only a short time subjected to the atmosphere, both were seized immediately afterwards by nausea, vomiting, and purging. The peculiar odour from the cholera patient once experienced can never be forgotten. The smell of the cholera ward of Scutari Hospital will live in the remembrance of everyone who witnessed the scenes among the Russian prisoners in 1855. Few, we believe, can breathe this atmosphere with impunity, for although cholera symptoms may not invariably supervene, few escape without "malaise," diarrhœa, or some appreciable indisposition; hence the necessity for well-ventilated wards flooded with fresh air, and regular relief of attendants. No doubt it is owing to the large and airy hospitals of India and its capacious barrack-rooms, that fewer attendants are attacked, than, for instance, in the badly-ventilated dwellings and hospitals of Malta. The experience of Indian practitioners is almost completely confined to the military and civil classes of Europeans, and the natives only in the public service and Government institutions, while the hot-beds of the disease in the

wretched filthy abodes of the poorer classes, who seldom receive any medical attendance beyond what the native "hakeem" affords, remain unexplored; thus, while among the latter the disease may be spreading and increasing by direct intercourse, the eye of the military surgeon is struck by its rapid and appalling extension, and the conditions that are fostering the disease in its propagation, he attributes the cause justly to an "epidemic influence" (the atmosphere around him being filled with the virus from the neighbouring haunts), and rigidly excluded all other methods of communication.

It is essentially necessary that every precaution with reference to the attendants on cholera cases should be adopted, such as special orderlies, frequent ablution, and strict attention to personal cleanliness. The patient should be placed in a well-aired ward apart from the rest, the bed-pan before and after being used should contain a solution of disinfectants, and the orderlies advised to wash their hands in some of the same before sitting down to meals, &c.

2nd. It is not requisite that a person should be labouring under symptoms of a choleraic character in order to convey the disease. There were many pointed facts to show, that like scarlatina and other allied diseases, cholera may be introduced and communicated to susceptible persons by healthy individuals from infected districts. Dr. Macdonald, F.R.S., in his elaborate and highly suggestive account of the yellow fever on board Her Majesty's ship "Icarus," on the West Indian Station, says, "It appears to me quite a mistake to think that no individual can communicate the disease to another, unless he himself is actually under its influence at the time or secondly, to consider such an individual as differing in any essential particular from an infected locality; indeed, a ship itself is only an individual on a larger scale. I have often looked upon my own monkey-jacket with horror, as the possible means of communicating so formidable a disease to others."* We opine the same holds good of cholera.

3rd. By means of clothing saturated by the dejections, either in a dry or wet state. Illustrations of this were frequent, as we have already adduced. As pointing to the same conclusion, we mention the following:—Infected bedding was left exposed for several days in the courtyard of a small hospital on a detached site, and where the patients were in the habit of frequenting. The smell was so great that no one would volunteer to remove the dirty articles. On the fifth day from the death of the previous admission from cholera, no less than three men with trifling complaints were attacked. The removal of the evil, and adoption of stringent sanitary measures, put a stop to any further development of the disease among the inmates. There is every reason to suppose that the poison emanated from the decomposing dejections in the bedding lying exposed to the strong heat of a Maltese sun. Dr. Zammit, an observing native practitioner, noted the frequent occurrence of cases of a similar nature when no precautions had been taken to destroy the dejections and vomit by disinfectants; and the rigorous enforcement by him of stringent rules on subsequent occasions led to the most satisfactory results.

Among the military medical officers there were few prior to the epidemic who had the least belief in the communicability of cholera, yet the evidence in favour of such a conclusion, under certain circumstances, soon became so strong and overwhelming as not to be withstood.

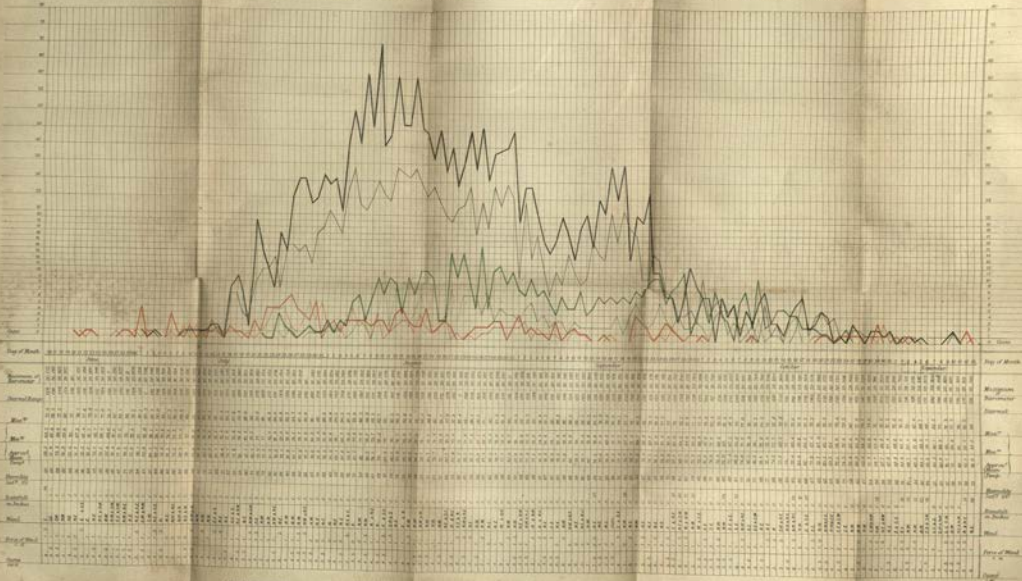
Owing to the significance of the terms "contagion" and "infection" being so exceedingly difficult to arrive at, and so diversely stated by authors of medical subjects, we have not considered cholera under these individual aspects, but merely as possible of communicability; and we have no hesitation in asserting, that while on the one hand it does not come up to the standard of variola, yet it is as easily transferred from the affected to a healthy susceptible person as typhoid fever, and under like favourable conditions.

Until late years the almost universal opinion with reference to cholera was all one way. The disease was considered essentially mysterious in its mode of successive production, but in nowise communicable from person to person in any of the above methods. Accordingly some inexplicable and pestilential state of the atmosphere was supposed to be the only mode by which the disease could originate and spread, hence the utter uselessness of quarantine, or any measures for the separation of the healthy and the affected. As a matter

* Statistical Report for the Navy of 1860, page 76.

CHART SHEWING THE DIURNAL FLUCTUATIONS OF THE CHOLERA EPIDEMIC OF 1865 IN MALTA AND GOZA.

The thick line indicates the Attacks. The thin one the Deaths. Black represents Malta. Green Goza. Red the Military Population.



NOTE. These Numbers are taken from the Official Returns. The Meteorological Table is Compiled from Observations taken at the Military Hospital, Valletta.

of course, public fears and panics could derive no encouragement under such a belief, and moreover it agreed with the views of those who look on all like devastations as "visitations of God's wrath" and "His invincible decrees." However much good such doctrines may have done in quieting the public mind, and preventing a recurrence of the frightful scenes that characterised the earlier cholera epidemics, they were far from the truth, and have indubitably been the means of shutting men's eyes to a rational and scientific consideration of a disease which, if not actually produced by man himself, has at least been fostered and kept in an active state by his culpable neglect of the study of the laws of health, and the conditions under which a beneficient Providence has placed him to live.

SUMMARY.

The main conclusions to be drawn from the epidemic of 1865 are—

1st. That cholera is communicable by human intercourse, and that this was the chief method of its diffusion throughout the Mediterranean basin.

2nd. That the influence of the atmosphere was limited merely to the effects produced upon the conditions that favour the propagation and production of the virus by great variations of temperature.

3rd. That wherever the disease lingered, there were clearly defined and remediable causes for the same.

That the localization of cholera is attributable to the neglect of the rules of hygiene is undoubted; that attention, in all particulars, to these rules will reduce to a minimum, if not completely annihilate, the devastations of the disease is equally clear; as well as the fact that precautions by quarantine against its introduction may be greatly limited, if not entirely set aside, provided the conditions favourable to the growth and propagation of zymotic disease be extirpated. The history of the Plague Hospital, Lower St. Elmo, Floriana, Horn Work, Isola Gate, and San Francesco Barracks demonstrate that the insalubrious and unhealthy construction and site of these buildings, adopted as fit for occupation by soldiers, were the causes of the localization and propagation of the disease. It would be irrational to suppose that whilst soldiers are located in the neighbourhood of a dense civil population, isolated cases of any zymotic disease present among the latter will not from time to time occur; but we maintain that, by proper construction of barracks on a healthy site, the authorities have it in their power to prevent any such recurrence of loss of life as was witnessed during the epidemic; and that, regardless of any other consideration than mere pecuniary advantage to the nation at large which would accrue from diminished deaths and invaliding, the balance is strongly in favour of evacuating many of the present barracks during periods of peace.

4th. That it is impossible to draw a distinction between cholera and choleraic diarrhœa; that both are essentially due to the same virus, and require the same precautions against communication.

5th. That when cholera is rife in the neighbourhood of a barrack, and the amount of diarrhœa is increasing among the inmates (this is easily ascertained by daily noting the applicants for medicine), it is advisable not to wait for cases of the disease to occur, but at once to effect a removal to an encampment on an isolated, dry, airy site, which, as was clearly proved, need not be at any great distance.

6th. The "atmospheric constitution," or "epidemic or pandemic wave influence," as alleged causes for the propagation of cholera, receive no corroboration from any meteorological or other appearances displayed during this epidemic. The whole evidence diametrically opposed such an opinion.

In conclusion, we take much pleasure in mentioning that his Excellency Sir H. Storks, G.C.B., gave especial directions with reference to supplying us with every assistance from the civil authorities, and accordingly we are indebted to Mr. Zemelli, Chief of Police, for his willingness to give us all the information in his power, and also Mr. Inglott, Comptroller of Charities. The copious records in the Principal Medical Officer's office and returns from each individual medical officer in charge of corps, were freely placed at our disposal by Dr. A. Anderson, Inspector-General of Hospitals; and to Staff-Assistant-Surgeon Roberts our thanks are due for the willing and ready manner he acceded to our numerous applications for the medical returns and reports.

GENERAL REPORT UPON THE CHOLERA EPIDEMIC IN GIBRALTAR,

During the Summer and Autumn of 1865:

By Deputy Inspector-General Rutherford, M.D.

The summer of 1865 in Gibraltar, up to the time when cholera first appeared, viz., 18th July, was regarded as unusually cool and agreeable, and the somewhat exceptionable good health of the inhabitants, civil and military was a subject for congratulation.

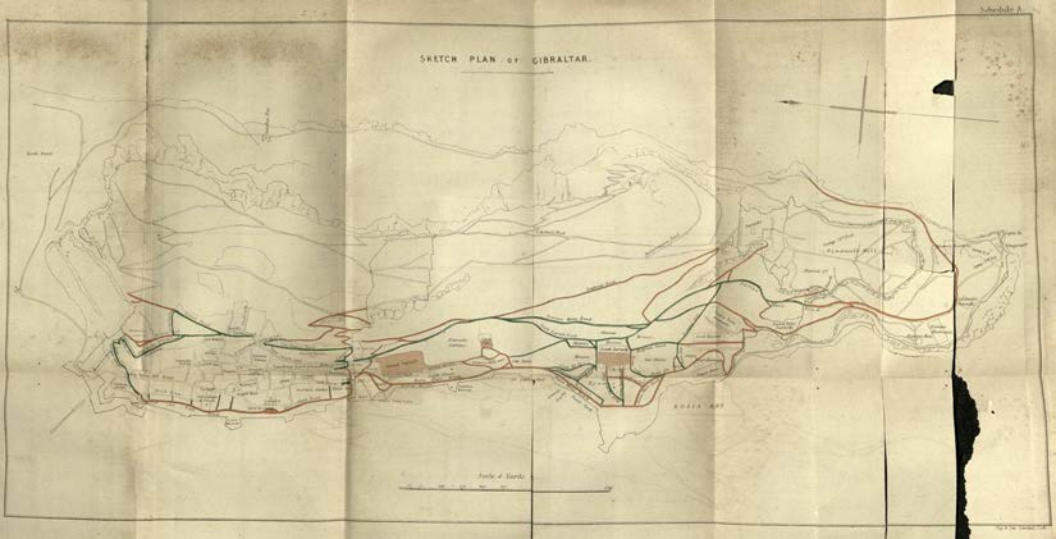
On the 10th of July, the 2nd Battalion of the 22nd Regiment, in a perfectly healthy state, arrived from Malta, *en route* to the Mauritius, in the steam transport "Orontes," and was encamped on that portion of the plain between the northern portion of the rock and the mainland of Spain called the "North Front," outside the fortress, and which, having had the character of being a healthy locality, was usually appropriated to similar purposes.

The regiment, previous to leaving Malta, was reported to have been "healthy and free from choleraic taint," although, at the period of its going on board the "Orontes," viz., 5th and 6th July, cholera was raging with great violence in an outwork in the immediate vicinity of the point of embarkation.

From the day of arrival at Gibraltar (10th July) until the evening of the 18th, with the exception of one trifling case of diarrhœa, the corps enjoyed good health. At 9 P.M. of the latter date, however, a private named Bird presented himself to the Medical Officer in charge, labouring under cholera, and died at 10.30 the following morning. Reports were immediately circulated that, previous to the attack, this man had been drunk, lying out in the sun, had eaten large quantities of unripe fruit, &c., all which statements the most minute inquiries failed to substantiate. On the contrary, it was proved that he had attended evening parade at 7 o'clock of the day of attack. Immediately after the occurrence of this case the camp was broken up, the head-quarter wing of the regiment, to which Private Bird belonged, being placed on board the transport "Star of India," which, after a detention of 48 hours, was permitted to proceed to sea, all the people being apparently perfectly healthy. The left wing, the transport for its conveyance not having arrived, changed ground to a considerable distance from the original camp. Here, with the exception of two cases of diarrhœa admitted into hospital, good health was maintained until the 31st, when a man named Davis, of intemperate habits, and who had been more or less unwell for two days, was attacked at 11 o'clock A.M. with vomiting and purging, and other symptoms, which speedily assumed all the characteristics of cholera, and which proved fatal at 8 o'clock the same evening. On the same day a delicate woman of the detachment was also attacked, and died at two o'clock the following day (August 1). The transport "Davenport" having at length arrived from England on the afternoon of the 30th, the troops were immediately embarked, and all being found in apparently perfect health, no extension of the disease having occurred, the ship, after a detention of 60 hours, sailed for her destination. It is believed that both vessels arrived in due time at Mauritius without any further development of the disease.

On August 3rd, one day after the departure of the 22nd Regiment, two cases of cholera occurred among the troops in garrison—one in the person of a corporal of the 15th Regiment in charge of the cemetery at the North Front, and the other in a child of his, aged four years; the latter dying in 15 and the former in 48 hours. Another child of the same family, aged six years, was seized shortly afterwards, but recovered. This family lived in a detached cottage at the North Front, outside the fortress, and about a quarter of a mile to the south-west of the site of the 22nd's camp.

On 9th August a weakly woman of the Royal Engineers, living in a cottage in the same locality was attacked, and died in 56 hours. Early in the morning of the 10th a private of the 15th Regiment, living in the Casemate Barracks, inside the walls of the fortress, was seized, and died in about eight hours. During the afternoon and night of the same day, seven cases, two of a very


SKETCH PLAN of GIBRALTAR.

severe character, occurred in the same regiment in the same barracks (Casemate), about 400 yards to the south-west of the above cottages, one terminating fatally in 37 hours. Up to the morning of the 11th August the disease was confined to the military. Now, however, we find a child, aged seven years, of a poor civilian living in a boat or lighter in the harbour, about 250 yards to the west of the Casemate Barracks, dying of the disease, after an illness of about seven hours. On the 14th the child, aged four, of another civilian living in the South District, fully a mile and a half from the latter locality, was reported by the Medical Officer in charge to have been attacked, ultimately, however, recovering.

On 15th August a Sapper, one of a small party living in detached cottages at the North Front, died after an illness of about nine hours. All these cottages were immediately evacuated, although no striking insanitary conditions were apparent in the immediate neighbourhood.

On the 18th another soldier of the 15th Regiment, living in a different room in the Grand Casemates, was seized, and died on the following day.

On the 19th August the disease made its appearance in a new locality, viz., the Town Range Barracks, situated in a low insanitary neighbourhood in the centre of the town—one of the Sappers living there dying after an illness of a few hours.

On the 20th a soldier of the 23rd Regiment, stationed in the South Barracks, built upon a fine commanding site overlooking the harbour, and hitherto untainted, and at a distance of about a mile from the town, died after a short illness. It is open to speculation whether this man contracted the disease in his own barracks or in some tainted locality.

Up to the above date only six cases, including the two children already alluded to, occurred among the civil population, two proving fatal. These individuals lived in different and widely-scattered portions of the town and neighbourhood.

On the 21st a somewhat sudden increase of cases occurred among the civil population, seven cases and two deaths having been reported.

Here I beg to draw particular attention to the medical history of the 1st Battalion 9th Regiment, in connection with this mysterious disease. This corps formed part of the garrison during the earlier period of the epidemic, and although stationed in very insanitary barracks in bad neighbourhoods, had maintained a wonderful degree of good health, its number of sick in hospital being occasionally as low as six. The regiment was under orders to embark in two divisions for the Cape of Good Hope, in the sailing transports "Windsor Castle" and "Renown," from which, on 15th and 17th August, the 78th Highlanders had disembarked. The left wing of the 9th embarked in the former ship on the 19th, and reached its destination all well. On the 21st the headquarters wing, hitherto quite untainted, went on board the "Renown," a large, well-ventilated ship, moored at the New Mole, as the other transport had been. On the following morning (22nd) a very severe case of cholera occurred on board, in the person of a very intemperate man of the regiment named Doyle, and who had been stationed in the Town Range Barracks. In this case the collapse stage set in very quickly, and the man died in a very few hours. Meantime the ship was hauled into the stream, and no further extension of the disease having occurred for upwards of 30 hours, proceeded to sea; and now occurs a fact very suggestive at all events as to the propagation of cholera by human intercourse, for on the 5th September, after being 13 days at sea, and 14 days after the occurrence of the above case, the disease broke out on board the transport "in a very malignant form," carrying off nine men, one woman, and some children, and finally the ship's surgeon. After continuing 14 days, it finally ceased on the 19th September.

Although I refrain from drawing any certain inference in a disease so protean as cholera, I cannot help drawing attention to a curious similarity, in point of time, in some of the stages in the late epidemic. As for instance:—From the date of the embarkation of the 22nd Regiment at Malta, on 5th July, to the occurrence of the first case of cholera in the corps at Gibraltar, on the evening of the 18th July, 13 *or* 14 *days*; from the occurrence of the latter to the two next cases on 31st July, 13 *or* 14 *days*; from 22nd August, the date of the case of Private Doyle on board the "Renown," in the harbour of Gibraltar, to the 5th September, when the disease recurred at sea, 13 *or* 14 *days*; and, finally,

the duration of the attack on board the "Renown," from the 5th to 19th September, 13 *or* 14 *days*.

Do any of these facts point to the contingency of this terrible scourge having been imported from Malta into Gibraltar by the 22nd Regiment?

It can scarcely be imagined that individuals on board a roomy, well ventilated ship, nearly new, I believe, and far out in the Atlantic Ocean, can have imbibed the choleraic poison from the atmosphere or ocean, and hence no other inference can well be drawn, than that, in some form or other, it was exported from Gibraltar, remained dormant for a period of 14 days or upwards, until meeting in the tropics, perhaps, conditions favourable to its growth, developed itself with peculiar virulence, and that at a time when, it is curious to observe, it was attaining its culminating point at Gibraltar, viz., the middle of September. If the disease can and does remain dormant for 14 days and upwards, may not an explanation be afforded of the futility of quarantine laws, which frequently impose three, four, six, or ten days observation upon vessels having "health on board," and which come from so-called "infected ports?" Further, if quarantine laws are of any use in preventing the access of the disease, it might be concluded that they should be imposed early, and upon the occurrence even of sporadic cases, inasmuch as there is some doubt that cholera had assumed a really epidemic character previous to the departure of the "Renown" from Gibraltar.

Towards the latter end of August, the disease may be said to have more or less assumed the ill-defined epidemic form at Gibraltar, and on the 24th the Spanish authorities established a cordon across the neutral ground, completely cutting off all communication with the mainland, except under the strictest surveillance, thus in a great degree interfering with the trade and prosperity of the place, depriving the poorer class of inhabitants of much of their means of living, and consequently exercising an unfavourable influence upon their health, moral and physical. On the other hand it is to be observed that the towns and villages adjacent to Gibraltar continued to the end free from any epidemic visitation, although vague reports asserted that a very few cases had occurred.

Again, the port of Tangiers, on the coast of Barbary, with which much commercial intercourse is usually kept up from Gibraltar, established a very rigorous and most unneighbourlike exclusion, at first indeed refusing all intercourse under almost any circumstances, although subsequently relaxing it to a strict quarantine regulation, altogether escaped the disease, as far as is known here. It is further asserted, I know not with what truth, that the same immunity was experienced by other ports in the Mediterranean, from which vessels from Alexandria and other infected ports were altogether excluded. Moreover, it is affirmed that, bursting out in Alexandria in the middle of June, cholera appeared almost immediately afterwards in all those ports in direct communication by steamboat with Alexandria, to which the thousands of fugitives had fled from Egypt to escape from the disease: thus we find it appearing almost simultaneously at Malta, Ancona, Marseilles, Smyrna, and Constantinople.

They who contend for the local origin of the epidemic in Gibraltar have much to rest their argument upon, for doubtless there are few places where a greater number of insanitary conditions are found combined. The dwelling houses, particularly of the poorer classes, are badly constructed, heaped almost "on the top of one another, many of them damp and dangerous to life," and with very great overcrowding of the inmates. The drainage from these houses is very bad, or none at all.

The public drainage also is very defective. Indeed during the summer months, owing to nearly the total absence of rain-water, the drains are literally converted into nothing more than noxious cesspits. The surface drainage, paving, and occasionally the cleansing of the courts or "patios," are little attended to. Filth is found inside houses in considerable quantities. "No proper soil-pans, or other suitable domestic conveniences, presenting arrangements most offensive and dangerous to the public health of the town and garrison." The cardinal want is in the supply of water, "which is very bad, deficient, and costly." Sometimes the supply is barely sufficient for actual domestic wants, leaving none for flushing or any similar purpose. Under these circumstances, it is not to be wondered at that epidemics originate and prevail to a very serious and destructive extent at certain intervals.

From about the 20th August the disease commenced spreading, cases occurring in places widely separated, and apparently differently circumstanced, as regards sanitary conditions; and although some individuals, seemingly in good health, were seized after a premonitory diarrhœa of variable duration, yet it generally selected as its victims those whose health had been previously deteriorated by various causes and circumstances. On the 13th September the disease attained its height, 53 cases and 22 deaths having been reported among the civil and military population. From this day until the 26th the average daily number of attacks was about 35, and deaths 15. On the 27th September a considerable decrease occurred without any apparent atmospheric cause, and happily continued until the 12th October, when the diminution in the number of cases became still more marked, the disease finally disappearing on the 27th, the last case among the military having occurred on the 24th in the Moorish Castle inside the walls, and that of a sailor in the harbour among the civil population, on the 27th.

Of course the only prophylactic measure at all satisfactory was the immediate removal of individuals from the infected localities, a proceeding, as far as the military were concerned, adopted as soon and as quickly as possible, in some cases an immediate check occurring to the progress of the disease. In other instances, however, although the troops so removed were encamped in the most available and healthy localities in the south, fully exposed to the full influence of the sea breezes, the poison appeared to have accompanied them, developing the disease in a few individuals only, and then ceasing. Thus one company of the 32nd Regiment, living in barracks at Buena Vista, a fine healthy locality, was visited by the disease. The men, with those of two other companies in neighbouring rooms, were encamped at a considerable distance on Europa Flats, and did not immediately shake off the disease, three having been attacked shortly after the encampment was formed. It is worthy of remark that these victims belonged to the company originally attacked. A somewhat similar circumstance occurred in a detachment of the 15th Regiment, removed from one of the casemates in town to the camp on Windmill Hill plateau; but it is also extraordinary that no extension of the disease to other individuals encamped in their immediate vicinity took place.

The well-known and oft-quoted fact that hospital attendants appear to enjoy a comparative immunity from cholera did not altogether hold good in the late epidemic, as several of this class, including a serjeant compounder, a very fine healthy young man, and one patient labouring under skin disease in a well-ventilated, clean, and by no means overcrowded hospital, were fatally attacked. I may remark that particular care was adopted to segregate the cholera patients as much as possible, and to deodorise or disinfect their evacuations, &c., by every kind of known disinfectant.

I need scarcely say that diarrhœa prevailed to a very great degree during the epidemic, and that, as usual, every exertion was made to induce individuals so affected to apply for medical assistance at as early a stage as possible.

With regard to the state of the weather, &c., the following resumé may be introduced:—

July—From 1st to 18th, weather fair, cool, and bright, with a large proportion of west wind, and little cloud. Population and troops remarkably healthy. From 19th to 31st, weather of same character; west wind in excess; nights very cool for the season. No spread of cholera since the 18th.

August.—From 1st to 20th, weather of same kind; west wind continues; cool; spread of cholera slow, but steady; one case at least nearly every day. From 21st to 30th, weather as before, with, however, a larger proportion of gloomy days. From 26th, threatening appearance of rain, or change of wind. 20th to 25th, barometer unusually low. On 30th, east wind set in. On the 20th cholera suddenly appeared in various parts of the town, reaching to about seven cases per day, and continuing steadily so until the 31st.

September.—From the 1st to the end of month east wind prevailed without intermission, and in consequence there was a continuance of gloomy, hazy weather, with a dense and oppressive atmosphere, rendering all exertion distasteful. Levant mists ("Levanters") almost constant; cloud nearly 10 (maximum); the barometer was high; ozone abundant. The thermometer in air read slightly higher than usual, while on the grass and in the sun it ranged considerably below the average. Thunder-storms, without rain, occurred on 5th

and 9th. From 21st, lightning occasionally. On 25th and 28th showers of rain occurred. On 30th the barometer fell, and there was a thunder-storm with heavy rain; all appearance of the rainy season setting in. No increase of cholera up to the 5th. On the contrary, the number of cases had diminished from 27th August. On the 6th and 9th, after the dry thunder-storms, the cases doubled in number. On the 12th, without any appreciable change in the weather, they again became much more numerous, reaching a maximum on the following day. On the 20th a decrease appears, apparently unconnected with the state of the weather; and on the 27th a still further diminution, which continued until end of the month.

October.—On the 1st, west winds began to prevail, in consequence of which the gloomy oppressive Levant mists disappeared, the weather becoming fine and clear; temperature about the average of years. On the 5th some rain fell. On the 10th very heavy rain, which recurred on 22nd. No marked change in the number of cases until the 13th, three days after the heavy rain, from which date a steady diminution occurred until the final extinction of the epidemic towards the end of the month, the last case occurring about the 27th."

The Spanish authorities removed the cordon on the 24th November, nearly a month after the occurrence of the last case, and exactly three months after its first imposition.

The epidemic appeared to me to be somewhat different from similar outbreaks which I had witnessed in India and other places, in, firstly, the length of time of its continuance; secondly, the circumstance of its having attacked a large number of children of tender age, some mere infants, in whom the symptoms were well marked; and, thirdly, the severity of many of the last cases, some of the patients seized towards the termination of the epidemic dying in a very few hours.

Postmortem examinations made in the garrison hospital threw no additional light on the pathology of the disease.

With regard to the treatment, I may, in conclusion, say that in our large military hospital here almost every known plan, from the rhubarb and castor oil of what some call the "expectant," to the strychnine of the more "heroic" class of practitioners, including hypodermic injections of quassia, ice to the spine, &c., chloroform in various shapes, salines, &c., was put into practice, and all with the well-known and lamentable result, that a remedy for this mysterious scourge has yet to be discovered.

The accompanying return, showing the probable numbers of the civil population and strength of the military, may indicate the severity and virulence of the disease. Among the former class are included the convicts, who suffered very severely; for out of a number of between 700 and 800 individuals, cut off in great measure from all intercourse with the other inhabitants of the rock, no fewer than between 50 and 60 died.

I may remark that all the cases returned among the military may be regarded as of true spasmodic cholera—a fact which, as regards the civil population, I do not vouch for, as I believe that cases bearing but slight relations to that formidable disease were in some, if not many, instances returned as of the latter class.

Extract from Gibraltar Chronicle, November 9, 1865.

"The disease showed itself with the greatest severity in the convict establishment. The first convict was attacked on 6th September, and between that date and 9th October, or in little more than a month, out of a total of about 700, 80 were attacked, and 56 carried off. The disease then suddenly ceased in this quarter, only one case occurring subsequently.

"Assuming the civil population to number 15,000, the military 5,000, and the convict establishment 700, the total number of deaths, 575, for the whole population amounts to 27·7, or nearly 28 in 1,000, which is not far from the average mortality in the United Kingdom.

"Comparing the mortality in the different sections of the population, we find that the deaths in the civil population have been 28 in 1,000, those of the military only 19·6, or less than 20 in the 1,000, while the mortality among the convicts was at the rate of 81·4 in 1,000.

"The late visitation has caused greater mortality in Gibraltar than the three previous ones of 1834, 1855, and 1860."

RETURN showing the Total Number of Cases of Cholera which occurred among the Civil Population and the Troops at Gibraltar, from the 18th July, 1865, to 27th October, 1865, inclusive.

	Probable Numbers or Strength.	Attacks.	Deaths.	Percentage of Attacks and Deaths to Strength.	
				Attacks.	Deaths.
Civil Population ..	15,000 ?	902	477	6·01	3·18
Troops	5,978	163	106	2·73	1·77

ADDENDUM TO FOREGOING REPORT OF DR. RUTHERFORD,

BEING REPLIES TO QUESTIONS SUBSEQUENTLY PUT TO HIM.

Gibraltar, 28th July, 1866.

Query No. 1. "Whether the 2nd Battalion 22nd Regiment had had any case of diarrhœa while on its passage from Malta to Gibraltar?"—*Answer.* One case of diarrhœa occurred in the battalion on board the 'Orontes' previous to the 8th July: no further particulars are known as the patient was discharged from hospital before arrival at Gibraltar on the 10th July.

Query No. 2. "Whether diarrhœa had occurred among the crew of the 'Orontes' during the voyage?"—*Answer.* The "Orontes' arrived here on 10th July, 1865, and reported that no sickness or death had occurred on the passage from Malta to Gibraltar. (*Vide* document accompanying marked A).

Query No. 3. "The precise date when the trifling case of diarrhœa manifested itself upon one of the corps of that regiment (22nd) after its arrival at Gibraltar, and previous to the outbreak of cholera, viz., between the 10th and 18th July, the character of the diarrhœa, and how many days it lasted?"—*Answer.* Nothing more is known of this particular case than that it was not of such a character as to require admission into hospital, from which fact the inference is drawn that the case was not severe and was probably of short duration. The medical officer, under whose care the patient was, is now in the Mauritius with his regiment.

Query No. 4. "Was there any prevalence of diarrhœa, or suspicion of cholera having shown itself in the fortress or town of Gibraltar previous to the arrival of the 22nd Regiment?"—*Answer.* As regards the troops in garrison, the return marked B, carefully prepared from records in my office, shows the precise number of admissions for diarrhœa into hospitals from the 1st June to 15th July for the last five years, including 1865. In the last it will be seen that 21 admissions occurred—no fewer than 14 from one regiment—the 32nd, which arrived from England on 4th July, 1865. If these be excluded 7 will represent the total admissions into the military hospital for the period specified. There was no suspicion of cholera previous to the arrival of the 22nd. With reference to the 'town' I may remark that, as regards the medical attendance of the poor, the entire Rock is divided into four districts, to each of which a paid medical officer is appointed. From each of these gentlemen I have obtained the accompanying statements (marked C) which will speak for themselves. Mr. Baggetto shows a considerable number of cases of colica and diarrhœa in 1865, although fewer than in the corresponding period of the previous year, when cholera did not prevail.

Query No. 5. "Had any vessel coming from an *infected* source been admitted into Gibraltar *before* the arrival of the 'Orontes,' and *before* the

appearance of cholera on the Rock?"—*Answer.* The accompanying documents (marked A), furnished me by the captain of this port, will, I think, satisfactorily answer this question. From it will be seen that the 'Cairo,' with a *clean* bill of health from Alexandria, dated 9th June, although not admitted at Malta, was 'admitted here by Board of Health' on 21st June, the Board considering that the ship's bill of health was the only reliable document to be guided by in the absence of more specific and satisfactory information. As regards the steamer 'Syria' (No. 7) it will be seen that she left this harbour *in quarantine*, leaving behind three passengers who were transferred to a quarantine vessel, and who after performing their allotted quarantine were admitted on the 13th July. The same occurred with some cargo left by the 'Morocco.'

Query No. 6. "Was there cholera in Spain, or on the opposite shores of Morocco, at, or previous to the date of its appearance in Gibraltar?"—*Answer.* I believe not, on 4th August it was reported by the Spanish authorities that cholera existed at Valencia. The utmost difficulty was experienced in obtaining any information of a reliable character upon this and similar subjects.

"In connexion with the outbreak of cholera in the 9th Regiment on board the transport 'Renown,' I may be excused quoting from a letter received lately from the very intelligent surgeon of that corps.—'It was particularly strange that the *first* case of cholera occurred in latitude 12° 16′ N.,* longitude 27° 02′ W., and the *last* case in 13° 58′ S. latitude, and longitude 30° 04′ W., the appearance of the disease and its leaving the ship being almost equally distant N. and S. of the line. On the 19th September we had three deaths and these were the last that occurred, and from that date we had not a symptom of the disease on board.

A.

The 'Orontes' arrived here on the *10th July, 1865*, and reported that no sickness or deaths occurred on the passage from Malta to Gibraltar.

First case of cholera on 18th July, 1865.

The following vessels arrived here from Alexandria and Malta :—

21st June	"Cairo"	Brought a Clean Bill of Health from Alexandria, dated 9th June; not admitted at Malta, admitted here by Board of Health.
26th „	"Rhone"	Foul Bill of Health from Alexandria, dated 15th June, not admitted.
28th „	"Italian"	Not admitted.
1st July	"Tarifa"	Not admitted.
4th „	"Danube"	Not admitted; two men with bowel complaint, and master died at Alexandria.
5th „	"Ellora"	Not admitted; had several cases of diarrhœa, and two deaths from cholera.
6th „	"Syria"	Left in quarantine; but three passengers performed quarantine in a vessel here, and were admitted on 13th July.
6th „	"Morocco"	Left in quarantine; but some cargo performed quarantine in a lighter and admitted 13th July.
6th „	"Wyvern"	Not admitted; a passenger died between Alexandria and Malta, and another one hour after being landed at Malta.
7th „	"Ionia"	Not admitted.
9th „	"Dalmatian"	Not admitted; a man died, and two landed at Malta.
10th „	"Grecian"	Not admitted; landed one man at Malta.
14th „	"Luxor"	Not admitted; a lady died of dysentery between Malta and Gibraltar.
15th „	"Crimean"	Not admitted.
17th „	"Nyanza"	Not admitted; a passenger died 9th instant of cholera, Bills of Health from Alexandria and Malta, that from Malta dated 12th July; one passenger performed quarantine here and was admitted on 24th.

* About latitude of Aden, Pondicherry, &c.

On the 4th August it was reported to the Board of Health, by the Spanish authorities, that cholera existed at Valencia.

I am not aware that cholera existed on the opposite shores of Morocco at or previous to the date of the appearance of it here.

Port Officer, 21st *April*, 1866.

Received from the captain of the port on 21st April, 1866.

(Signed) W. RUTHERFORD, M.D.
Deputy Inspector-General.

B.

Principal Medical Officer's Office,
Gibraltar, April, 1866.

RETURN showing the Number of Cases of Diarrhœa which occurred among the Troops in Garrison at Gibraltar from 1st June to July 15th in each of the following years.

	Cases Admitted to Hospital.
1861	36
1862	30
1863	47
1864	10
1865	21* (7)

W. RUTHERFORD, M.D.,
Deputy Inspector-General of Hospitals.

C.

No. 1 District, Gibraltar,

Dear Sir,—In answer to your letter regarding the question whether there was any prevalence of diarrhœa, or suspicion of cholera in the town previous to the 10th of July, 1865, I beg to state that during the three months of April, May, and June, I attended in the ten districts for the poor for which I am appointed medical officer, and which contain about one-third of the poor population of the garrison, only one case of diarrhœa, and in private parties three; and that I found the civil population, except the cases of small pox, enjoying unusually good health.

Yours, &c.,
(Signed) A. WORTMAN, M.D.,

Dr. RUTHERFORD, *Principal Medical Officer, &c., &c.*

No. 2 District,

Gibraltar, 23rd April, 1866,

Sir,—In answer to your note of this day's date I beg to inform you that previous to the 10th July last past, I had not seen in my public or private practice any cases of diarrhœa, cholerine or cholera, the health of the city, so far as I was concerned, had been unusually good till the 19th August, on which day I was called by Dr. Crow to see and give my opinion as to the decease of Domingo Serme, who had been taken ill that same afternoon of real Asiatic cholera and died the same night.

I remain, &c.,
(Signed) J. CORTES.

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* Of these cases, fourteen were admitted in 32nd Regiment which arrived from England on 4th July. These admissions were attributed by the surgeon to "the fruit, drink, and change of food with men just arrived at the station." Exclusive of these, seven cases only were admitted from the garrison during the period.

No. 3, South District. *Gibraltar, 24th April*, 1866.

Dear Sir,—In reply to your note of yesterday I beg to inform you that, on looking over my memorandum book, I find that no cases of diarrhœa or suspicion of cholera were under my care previous to the 10th of July, 1865.

I remain, &c.,

(Signed) C. J. TRENNERY, M.D.

Civil Hospital District, No. 4.

STATEMENT of Gastric Diseases which have been attended as Out-Patients during the Months of May, June, and July of the undermentioned Years showing that these Diseases were more prevalent in the Years in which Cholera made its appearance than in those preceding.

	Colica.	Diarrhœa.	Total.
1853—			
May	29	25	54
June	47	42	89
July	51	62	113
Total	127	129	256
1854—			
May	48	46	94
June	59	45	104
July	31	43	74
Total	138	134	272
1855—*			
May	19	23	42
June	16	56	72
July	43	166	209
Total	78	245	323
1859—			
May	30	26	56
June	45	18	63
July	44	25	69
Total	119	69	188
1860†—			
May	65	63	128
June	48	55	103
July	44	86	130
Total	157	204	361
1864—			
May	43	52	95
June	53	86	139
July	35	50	85
Total	131	188	319
1865—			
May	36	56	92
June	48	54	102
July	24	28	52
Total	108	138	246

* Cholera made its appearance on the 1st of August.

† Cholera broke out on the 14th of August.

In the year 1854 cholera made its appearance on the 31st of August, during this month there were 39 cases of colica and 39 of diarrhœa, previous to the first case of cholera.

In the year 1865 the first case of cholera was reported on the 18th of July, so that number of cases, here shown, are only to that date; there were during the latter part of the month 8 cases of colica and 26 of diarrhœa, although the epidemic had declared itself.

I have also remarked in visiting my districts, amongst the poorer classes, that previous to the appearance of cholera there have been frequent cases of dyspepsia and other gastric disorders, which were so slight that they have not been recorded, insomuch that the parties affected were not obliged to discontinue their usual labour.

The gastric disorders, which I mentioned in my report of the 3rd February last, are not of a choleraic nature, but slight cases which occur from time to time in all climates.

(Signed) JOSEPH BAGGETTO
Assistant-Surgeon.

Civil Hospital, Gibraltar, 27th April, 1866.

EXTRACT REGARDING THE OUTBREAK OF CHOLERA IN THE SHIP "RENOWN," ON PASSAGE FROM GIBRALTAR TO THE CAPE OF GOOD HOPE.

FROM A LETTER OF DEPUTY INSPECTOR-GENERAL LAWSON.

THE *Renown* is a fine, roomy vessel, of 1,293 tons register, with a single troop-deck, extending from stem to stern, 202 feet long, 32 feet wide, and 7 feet 4 inches in height from deck to deck. As her beams are iron, they occupy very little space. There are thirty-six side-scuttles, two hatchways, stern lights, two large uptake ventilating shafts in the after part of the berth-deck, and a downcast shaft there in addition. I have never seen a ship better provided with means for ventilation. At various places in the berth-deck, the timbers were not covered with lining quite up to that above, so that emanations might pass from the hold to the berth-deck. There were other openings along the gunwale-rail, communicating with the spaces between the timbers, intended for the ventilation of the hold; but they appeared small for this purpose.

The ship's provisions were put on board by the Admiralty, and were all of good quality. A certain quantity of water was taken on board at London, and some at Gibraltar, which was partly stowed in casks, partly in tanks, and, although coloured by the casks somewhat, is reported to have been of fair quality. There was also a distilling apparatus on board, capable of producing 500 gallons a-day. Subsequently to the appearance of cholera, cask or tank-water was not used for either cooking or drinking, distilled water only being employed for these purposes.

The ship had in cargo an assortment of articles for general use, for the Indian market, and besides, had iron and shingle ballast, with sand. There was a quantity of the latter under and around the main hatchway when I was on board at Algoa Bay, on 8th November. It was then damp, but, on examination, did not present any appearance of mud or other matter amongst the sand.

The men were provided with hammocks and blankets, which were carried on deck daily. The women had standing bunks, with the usual bedding, in the after part of the berth-deck. The hospital, as is now customary, was on the port side, abreast the main hatchway.

The *Renown* sailed from Kingstown with troops on board on 3rd August, and arrived at Gibraltar on 17th. From the information at my disposal, it does not appear there was any bowel-complaint among the troops during the passage. The head-quarter wing of the 1st Battalion 9th Regiment embarked at Gibraltar on 21st August, part at 6.15 A.M., and the remainder at 5 P.M. One

man, Private John Doyle, of F Company, who went on board at the earlier hour, and was engaged getting in the baggage, was attacked with cholera about 9 A.M. on 22nd, and was immediately sent on shore to hospital, where he died. The ship sailed from Gibraltar on 23rd August at 5.30 P.M., with the details specified in the margin,* of whom there were accommodated on the berth-deck 345 men, 28 women, and 65 children.

On the wing of the 1st Battalion 9th Regiment, which embarked in the *Windsor Castle* for this colony, leaving their barracks at Gibraltar, a portion of 2nd Battalion 15th Regiment was removed into them from another barrack, where they are said to have been much crowded, and to have had some cases of cholera. The 2nd Battalion 15th Regiment were two days in these before the head quarters 1st Battalion 9th Regiment left, but they occupied a portion separated from that in which the 1st Battalion 9th Regiment were by the rooms of the married soldiers. The men of the two corps were not mixed up in any way; and Dr. Carroll expresses his belief that there were no cases of cholera among the 2nd Battalion 15th up to the time of the head quarters 1st Battalion 9th embarking, neither had there been any trace of the disease among the men of the latter corps previous to the attack of Private Doyle on board the 'Renown' on 22nd August.

There having been no farther indication of the disease up to the evening of the 23rd, the ship then sailed, and everything went on smoothly for some days. On the 29th a child was attacked with diarrhœa, and on the 30th, another. Both recovered in a few days. On the 3rd September, a serjeant of F Company, named Murphy, his wife and one child, were attacked with dysentery, which continued upwards of a fortnight. On the 5th, another child of the same family was attacked with cholera, of which it died the same day. This day, too, a soldier of F Company, who was berthed close to the main hatchway, was also attacked with cholera, which proved fatal on the 10th. The subsequent progress of bowel-complaints and cholera will be seen in the Table annexed, in which the ship's position each day, with the state of the weather, and the attacks and deaths from diarrhœa, dysentery, and cholera are given. There was no attack of bowel-complaint or cholera from the 20th September till the arrival of the ship at Cape Town on 9th October; and from that time until 10th November, when she sailed from Algoa Bay, the crew remained perfectly healthy.

The men sick of cholera were treated in the hospital, the females and children in the women's berth. The bodies of those who died were removed on deck at once, and buried soon after, and their bedding and clothing thrown overboard. The bedding and clothing of those who recovered were freely exposed to the air for some time. When the disease became prevalent, the people were kept on deck as much as possible during the day, every means was taken to maintain as free ventilation as possible, and the state of the weather was such as to permit all the scuttles and ventilators being kept open. But for the vigour with which these seem to have been enforced, I apprehend the attacks might have been much more numerous, and the mortality proportionately great.

As to the immediate exciting cause, the following facts are of importance. There were five companies on board, designated A, B, D, F, and K. Of these A was berthed farthest forward on the starboard side, F followed on the same side, occupying the space abreast the main hatchway, and, abaft F, the band and drums. B was foremost on the port side, followed by K, which occupied the space as far as the hospital. D was berthed amidships, in front of the main hatchway, between A and F on one hand, and B and K on the other. The attacks from diarrhœa and dysentery, and the attacks and deaths from cholera (there was no death from diarrhœa or dysentery among the men) in each company were as follows:—

* Officers, 16; men, 353; women, 28; children, 65; crew, 52.

	Diarrhœa and Dysentery.	Cholera.	Died Cholera.
A	..	..	..
B	1	1	1
D	4	..	..
F	4	9	6*
K	3	2	2

Thus the companies suffered in proportion to their vicinity to the main hatchway. One sailor who lived in the forecastle, but whose avocations took him into the hold, was attacked and died; also the Medical Officer of the ship, a man rather advanced in age and broken in constitution, who was berthed in the cuddy, but frequently among the sick in the hospital, and close to the main hatchway.

The women and children were in the after part of the troop-deck, and in the middle of their berth was a small scuttle, leading down into the after hold, which was sometimes opened. I have not got the position of the persons attacked with reference to this scuttle, but none in the berth could be very far removed from it.

The fact of those nearest the hatchways suffering most, whilst those who were farther removed from them were but little affected, leads me to suppose that emanations from the hold were the immediate cause of the outbreak on board this ship, favoured by the increasing temperature and greater stillness of the weather as she approached the line. The disease appeared fitfully, which appears to have been owing to the care taken to keep the people in the open air and to ventilate the berth-deck, but partly, also, to the positions in which this vessel encountered the pandemic waves she had to cross in her passage southward. I have several other instances in which ships ran into these waves, and manifested sharp outbreak of cholera immediately after; and doubtless there have been many others were the evidence only available.

Exclusive of the fatal case at Gibraltar.

"Extract from Log of Ship 'Renown,' from Gibraltar to Table Bay.

Day of Month.	Ship's Position at Noon.				Thermometer.	Winds.		Weather.	Diarrhœa.		Dysentery.		Cholera.	
	Latitude.		Longitude.			Direction.	Force.		Admitted.	Died.	Admitted.	Died	Admitted.	Died.
	°	′	°	′										
Aug. 25 ..	33	46N	10	0w	73	NNE.	Moderate	Passage fine throughout. Little rain. Not much calm weather, nor ventilation impeded by any cause	..	..	..	..	..	..
26 ..	32	25	12	52	73	NE.	Light		..	..	..	..	..	..
27 ..	32	2	13	43	73	NNE.	,,		..	..	..	..	..	..
28 ..	31	15	15	38	74	NE.	Moderate		..	..	..	..	..	..
29 ..	29	32	19	10	75	ENE.	Fresh		1	..	..	..	..	..
30 ..	26	23	21	24	77	NE. by E.	Moderate		1	..	..	..	..	..
31 ..	24	3	23	6	77	NE.	Light		..	..	..	..	..	..
Sept. 1 ..	22	1	24	26	78	NE.	,,		..	..	..	..	..	..
2 ..	19	52	25	38	79	NE.	Moderate		..	..	..	..	..	..
3 ..	17	35	26	48	80	NE.	Light		..	..	3	..	..	..
4 ..	14	51	27	8	81	NNE.	Moderate		..	..	..	..	..	..
5 ..	12	16	27	16	82	SE.	Light		..	..	..	..	2	1
6 ..	11	9	27	2	83	ESE.	,,		1	..	..	..	..	..
7 ..	10	19	27	14	83	,,	,,		..	..	..	..	..	..
8 ..	8	51	26	12	81	WSW.	Moderate		1	..	..	..	..	..
9 ..	7	41	24	18	81	SW.	,,		..	..	..	..	..	..
10 ..	6	27	21	40	80	SSW.	Light		..	1	1	..	2	1
11 ..	5	11	20	46	81	Southerly.	,,		..	..	..	..	5	5
12 ..	3	51	25	17	80	,,	,,		2	..	1	..	1	1
13 ..	2	31	27	5	79	SSE.	,,		..	..	..	..	2	..
14 ..	0	56	28	56	80	,,	Moderate		2	..	..	..	..	..
15 ..	1	23s	30	8	80	SE.	,,		3	..	2	..	..	..
16 ..	4	33	31	11	79	,,	,,		4	1	..	1	3	3
17 ..	7	50	30	59	80	ESE.	,,		1	..	..	..	..	..
18 ..	10	57	30	50	80	,,	,,		1	..	..	..	..	..
19 ..	13	58	30	4	78½	,,	,,		..	..	3	..	2	3
20 ..	16	22	29	24	79	,,	Light		1	..	1	..	..	..
21 ..	17	26	29	11	79½	Easterly	,,		..	..	..	..	..	..
22 ..	18	28	27	39	80	S. by W.	Moderate		..	..	..	..	..	..
23 ..	19	19	26	34	75	SSE.	Light		..	..	..	..	..	..
								Total ..	18	2	11	1	17	14

	Diarrhœa.		Dysentery.		Cholera.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Soldiers	9	..	5	..	13*	10*
Women	...	...	3	..	1	1
Children	9	2	3	1	2	2
Crew	...	...	...	...	2	2
Total	18	2	11	1	18	15

NARRATIVE OF THE LATE OUTBREAK OF ASIATIC CHOLERA ON BOARD THE STEAMSHIP "ENGLAND."

By Deputy Inspector-General Barrow, P.M.O., Halifax, Nova Scotia, 21st June, 1866.

The history of the outbreak of cholera on board the steamship "England" possesses features of more than ordinary interest. I therefore lose no time in forwarding such particulars as can be obtained. My information has been derived from the most reliable sources; I have personally examined the localities mentioned, and have had interviews with members of two of the families attacked; and their evidence again has been compared with that of the medical men attending them, and of other credible persons.

Where there is a panic, there is always gross exaggeration; and those accustomed to sift the history of epidemics will well understand the difficulties which must necessarily be met with, and how essential it is never to trust to hearsay or report, but to visit the localities of the epidemic disease, cross-examine witnesses, and to analyze most closely every trifling circumstance brought forward as a fact, before it can be taken as evidence. An amusing circumstance happened while I was serving in Jamaica eight years ago. In one of the Kingston newspapers there was a detailed account of the death from yellow fever of a sailor belonging to one of H.M. ships, which had just arrived with fever on board. The corpse was placed in a boat, and conveyed to some distant spot for burial. It was stated that a sailor from another (healthy) ship was one of the boat's crew on the occasion, and sat near the corpse. On landing, the same man acted as a pall-bearer. He soon contracted yellow fever, and died after a few days' illness. The "contagionist" papers at once took up this case as proving beyond all doubt that yellow fever was conveyed by infection. The "anti-contagionist" papers next entered the field, and brought every argument they could conceive to support their view of the case. The war waged hot and fiercely, but came to a very abrupt and undignified conclusion, for it was suddenly discovered (*horribile dictu*) that the deceased (!) boatman had never left his ship at all, and, moreover, never had fever, but was alive and in perfect health.

The circumstances connected with the late outbreak were as follows:—

The "England," a steamship of nearly 3,000 tons burthen, commanded by Captain Grace, sailed from Liverpool on the 28th of March, on her way to New York, with 37 cabin and 1,059 steerage passengers (Irish and German emigrants). The crew would number from 80 to 100; thus there would be nearly 1,200 individuals on board. In my letter of 26th April, I offered an opinion that the German emigrants probably carried on board the germs of cholera with them, and it now appears to be the case without any doubt, as the last mail steamer from England brought out the history of these emigrants. It is proved that many of them came from East Friesland, and travelled across Holland, where cholera was prevailing in several places. They reached the "England" at Liverpool, by way of Rotterdam and Hull. The ship touched at Queenstown on the evening of the 29th, and four days after leaving that port the first case of cholera appeared. Early on the morning of the 2nd of

* Including the man sent ashore at Gibraltar.

April, a German boy, aged eight years, was found dead from cholera by the side of his mother.* Within twelve hours, *i.e.*, during the evening of the same day, the Rev. A. Martin states that he was called to the bedside of Thomas Walsh, a stout Irishman, aged 35, who was suffering from severe cramps in his stomach and legs. He died at 2·30 next morning. The disease now "set in" with fearful severity; fresh cases were continually reported, and the deaths gradually reached 15 a day.

On the 9th of April the steamer entered Halifax Harbour in distress, there having been 46 deaths, and 150 cases. The weather at the time would be considered unfavourable for the spread of cholera, being chilly in the day time (the average temperature at noon during the first week was 42° 7′), and every night there was more or less frost (the lowest temperature for the week was 21° 6′). This had no effect, however, in staying the disease among the emigrants. The healthy were gradually removed from the ship, and encamped on the northern extremity of M'Nab's Island, which lies opposite the southern suburb of Halifax, the distance across being about half a mile. Here they were kept in quarantine, which, however, was anything but efficiently carried out; in fact, a good many emigrants escaped from the island altogether. It is known that ten got away.

The cholera cases were removed from the "England" to the block ship "Pyramus" for treatment; but such cases as appeared among the emigrants encamped on M'Nab's Island were treated in marquees on the spot. During the first two days after the ship's arrival at Halifax, the disease appeared to gain ground, and reached its height on the night of the 10th and morning of the 11th, when 40 deaths occurred in 12 hours, and over 100 were on the sick list; but of course there had been no time for the beneficial effect of encamping to become apparent. Dr. Slater declared that at that period 19 out of every 20 persons attacked died in from three to six or seven hours. At the end of the week Dr. Slater was himself struck down, after labouring most zealously, both on board the "England" and in camp. He died on the 17th of April, 17 hours after seizure.

A good many cases appeared in the camp, but the disease had in nearly every instance been probably contracted on board ship. The epidemic began gradually to decline in about ten days, when recoveries were rather more frequent. But from first to last, the ratio of deaths to attacks was above 50 per cent. The last case showed itself on the 30th April, and was a very mild one. Women and children suffered equally with the men. Premonitory diarrhœa was observable throughout, even before the first case of cholera, and Dr. Gossip (who was practising among the emigrants during their detention in quarantine) positively declares that when the premonitory diarrhœa was at once checked by medicine, no cholera followed. He prescribed for that symptom Laudanum, and Sp. Ammon. Arom., sometimes with Chalk and Catechu in addition, and occasionally with a few drops of Chloroform. The Doctor states that in a few of the cases of decided cholera, extreme collapse was the only visible symptom, the patients dying in from two to four hours. But generally all the usual symptoms were present. Many of those who recovered from cholera suffered from febrile reaction, with typhoid symptoms, and many died. Several cases were followed by gangrene of the toes and feet; amputation had to be resorted to in some instances. It was thought that the gangrene was the result of frost bites, but the cold was scarcely intense enough to produce such a result, even in tents; and some of the cases were even met with on board the "Pyramus." One case of gangrene of the nose, following cholera, was treated by Dr. Woodill in a cottage at Freshwater; the patient (Mrs. Evans) died of exhaustion. A post-mortem examination was made in two cases only. The written details of one have been lost. Dr. Garvie states he found in one instance the lining membrane of the stomach studded with reddened ecchymosed patches. The viscus contained half-a-pint of flocculent "rice-water" fluid, which was albumenous. The intestines contained much of the same fluid; the mucous membrane was congested throughout, and softened, in fact over Peyer's patches it was disintegrated, as if from ulceration. The deceased was a German, aged 40 years, and had been ill only twelve hours.

* I have no means of getting the history of this case.—F. W. B.

Neither the total number of cases nor of deaths among the emigrants can be determined with anything approaching accuracy; but the deaths amounted to at least 280 (Dr. Gossip thinks 300), and the cases to 500 or 600, without including attacks of simple diarrhœa. None of the saloon passengers were attacked; but two sailors, one steward, and three firemen died. The poor firemen stood but a poor chance, worn out by their severe duties in such a high temperature, and exposed at the same time to the cholera infection. The dreadful sanitary state of the emigrant's portion of the ship can be easily understood, and would fully account for their great mortality. When they first went on board, few had changed or even taken off their clothes it is believed for more than a week, they were in a most filthy state; then they were greatly overcrowded, and the weather was very bad, the ports had to be closed, and the hatches also, for some considerable time; nearly all were overcome by sea sickness; clothes and bedding were more or less saturated with ejecta; they had large quantities of saur kraut with them, and much of this became putrid; the condition of these poor people after a few days at sea can be imagined; it must have been horrible. Then the evacuations of the cholera patients could not be got rid of, as the cases became numerous. It was no wonder the disease spread with such rapidity, and was so terribly malignant.

We now come to the points of the greatest interest, viz., the transmission of cholera to the pilots and their families. At break of day on the 9th of April, a pilot named Terence was in his open boat, lying off Cape Sambro, five miles N.E. from Sambro Island, and about fifteen miles from Halifax. An assistant named Purcell and his son were also in the same boat. Between 4 and 5 A.M., the steam-ship "England" came in sight; on which Terence hailed the ship, and asked if a pilot were wanted. Hearing there was sickness on board, he did not leave his boat; a bucket was lowered over the ship's side, and in it the pilot placed some official papers, showing that he was properly licensed. The documents were not returned until the next day. A ten fathom rope was then thrown to him, by which the boat was towed astern at some considerable distance. These details I obtained during a conversation with Purcell. He told me the boat was towed as far as the quarantine ground between George's Island and the eastern shore, which would be a distance of about twelve miles. The "England" anchored here for an hour or two, whilst the pilots went to Cunard's Wharf for further instructions how to act. On their return to the "England," she was again got under weigh, the pilots now keeping their boat at a still greater distance astern. They took the ship to the west of M'Nab's Island (about two miles further from Halifax), where she remained anchored in the main channel until she left for New York. Here all communication between Purcell, his son, and the "England" ceased; for after seeing the steamer anchored for the second time, they went ashore in the boat with Terence. It will be better to complete the history of the Purcells before I again refer to the incidents connected with Terence. It is proved to a certainty by the corroborative testimony of Captain Grace and others, that neither of the Purcells was at any time on board the "England." Purcell returned home next morning (April 10th) to Portuguese Cove, eleven miles south of Halifax, and had an attack of diarrhœa on the following day (11th April), which gradually got worse on the 12th, 13th, and 14th; by the 15th he was greatly prostrated, and then vomiting appeared for the first time. He was always free from cramps. Two of his children (aged five and a-half and three years) were seized on the 15th with slight symptoms—with vomiting and debility—but quickly recovered. On the 16th April, the eldest daughter, aged fifteen, was attacked. She was dangerously ill with every symptom of true Asiatic cholera, and the attack was followed by reactionary fever of a low type. Thus, four individuals were attacked out of a family of nine persons, but there were no deaths. The type of the disease was probably greatly modified by the fair sanitary condition of the house and immediate locality. I found Purcell's house to be in an airy situation, on elevated ground, that is, at least 50 feet above the sea level. It was open to all winds. During the epidemic all the windows were kept open; the rooms were of fair size, though not lofty.

I must now return to the history of the other pilot, Terence. He left the anchorage ground of the steamship "England" on the 9th April, in the same boat as the two Purcells, and went ashore. Next day (10th April) he was

employed to pilot the block ship "Pyramus" from near the dockyard to the steamship "England," as the block ship was about to be made use of as a hospital for the cholera cases. He then returned to Halifax, without going on board the "England," as he himself affirmed; and Captain Grace, who commanded the steamship, also bears out the statement. I have, in addition, the evidence of the Rev. J. Carmody, that Terence on his death-bed declared he had never at any time been on board the "England." Terence slept that night (10th April), or rather, went to bed at a boarding-house in Water-street, Halifax. While in bed he was seized with vomiting, cramps, and purging, and next morning (April 11th) got in a boat and was rowed home to Portuguese Cove (where Purcell also lived), a small fishing settlement, about 11 miles distant by sea, to the south of Halifax. In his (Terence's) case there was much collapse, but it was followed by reaction and low fever, from which he died on the 19th April, after an illness of nine days' duration.

On the 14th April, or three days after Terence returned to his home, his daughter Elizabeth, aged five years, was seized with acute cholera at 6 A.M., and died the same evening at 9 o'clock. Next day (15th) three children were prostrated—Mary, aged three years, who slept with her father, had a severe attack, and died on the 17th, all the symptoms of Asiatic cholera having been present; Catherine, aged nine years, was dangerously ill; she recovered after consecutive fever. Susan, a year old, at one time seemed almost at the point of death, but reaction took place, and she recovered.

Out of five children living at home, only one (a boy aged eight years) escaped an attack. He slept in a room by himself, and was out of doors all day. Mrs. Terence, to the great surprise of herself, escaped. She declared she was frequently covered with the cholera discharges from the children. When I inspected her cottage, it did not appear astonishing to me that the disease should have shewn more malignancy than in the house of the man Purcell. Terence's cottage was on the lowest level of the village, pretty close to the sea; the land sloped upwards, very near the back of the house; and in wet weather the surface water ran, or found its way under the flooring,* where it was more or less dammed up. The rooms were small, with low ceilings, and badly ventilated.

Nine cases appeared among the two families, of greater or less severity. Two of them were so slight, that they could scarcely be called cholera; but it will be interesting to determine the probable period of incubation of the disease. I find one person suffered on the second day after exposure to contagion, two on the third day, three on the fourth, two on the fifth, and one on the sixth. The two pilots contracted the disease, strictly speaking, by means of infection, one, forty hours after exposure, the other, fifty-two hours after.

No other cases appeared at Portuguese Cove, nor, in fact, anywhere in the province, with the exception of several in a family residing at Freshwater, the history of which is as follows:—

A man named Evans, a puddler, in very indigent circumstances, his wife and two children, were living in a small cottage, not by any means in a good sanitary state, near the sea at Freshwater, which part of the town forms the southern suburbs of Halifax. A large quantity of bedding, saturated with cholera discharges, had been thrown overboard from the steamship "England" soon after her arrival, and for many days allowed to float about the harbour. Some of it drifted ashore at Freshwater, close to Evans's abode; and a woman living in the same house declared that she had seen his children playing with it. Dr. Woodill, who afterwards attended the family, told me that Evans also stated to him that his two children had picked up, and had been playing with some of the floating bedding. There is at the same time a strong suspicion that several of the family had been sleeping on an infected mattress. It is quite certain that some bedding had drifted ashore at that spot, and that Evans's children were playing close about it.

On the 22nd April, his eldest child, a girl about two years old, was seized with cholera, after having had diarrhœa for nearly a week. She was conveyed to the City Hospital, and died next day. The entire family was then sent to the hospital, and kept in a state of isolation. On the 24th, two days after the seizure of the eldest child, the second, a girl aged thirteen months was prostrated. Her case was a very severe one, but she recovered. Next, the mother,

aged 35, was seized on the 25th, and appeared to die from exhaustion on the 30th. No consecutive fever was apparent, but Dr. Woodill informed me that a day or two before death gangrene of the nose made its appearance, as I have before stated. No post-mortem examination was made in either of the fatal cases. The father had diarrhœa throughout, but declared he was at all times subject to it.

I was very anxious to find the man Evans, in order to cross-examine him as to whether any of the family did actually sleep on the infected bedding; but after being released from quarantine Evans was lost sight of, and could not be found. His house had been pulled down while the whole family were in the City Hospital. The situation of the house was decidedly bad; it was close to the bridge at Freshwater, at the point where the small stream runs into the sea, and there was an extensive surface of soft, black, offensive mud in the immediate vicinity.

The evidence of the propagation of cholera by means of fomites is exceedingly strong in the Freshwater case, although perhaps not quite conclusive. There were no other cases in Freshwater or in Halifax.

More than 30 years have elapsed since this province suffered from a cholera epidemic. Bearing this in mind, let me now give a general *resumé* of the facts as they occurred. Here was a ship, fearfully over-crowded, with emigrants in a most filthy condition, and with the germs of cholera within them, which soon burst into activity, traversing nearly two thousand miles of ocean, and in twelve days arriving at Halifax, N.S., a healthy city, where cholera had been unknown for many years. Two pilots who were towed astern of the ship in question, having never been on board, in two or three days contracting cholera, one of them dying, and both transmitting the disease to their families, living at a distance of ten miles from the infected ship; one other family only being attacked, through the medium (with scarcely a doubt) of infected bedding. With these facts before us, I am justified in saying that a clearer proof of the infectiousness of cholera cannot possibly be produced. Such convincing evidence of the propagation of the disease purely by infection, as in the instance of the pilots, cannot be expected to be obtained in Europe; for there we trace cholera gradually extending itself in one or more directions, and it is all but impossible to determine whether its sudden appearance in a locality is owing to contagion, infection, or to an epidemic influence. In India, the difficulty is still further increased from the fact that cholera is ever lurking in some district or another. Added to this, in India, barracks, hospitals, and dwelling-houses, are so constructed that there is always a free and thorough circulation of air, the material cholera poison, in whatever shape it may exist, must therefore necessarily be greatly diluted, and comparatively innocuous. This accounts, in my opinion, for the very common belief among medical men in that country, that the disease is not communicable, and it is not surprising, when in the hospitals, the attendants and medical officers in constant and close proximity to the most malignant cases, are seen to be rarely attacked.

I conclude by stating that in this quarter of the world I was unable to trace the existence of cholera at the time in question, nearer than the French West India Island, Guadaloupe, and no vessels had arrived from that island. The distance of Guadaloupe from Nova Scotia is almost as great as that of England or Holland.

REPORT UPON THE STATION AND VICINITY OF NEEMUCH, with reference to the recent Outbreaks of Cholera which occurred in the Left Wing of H.M.'s 45th Foot, from May to October 1865, the Means adopted to check its Spread, and a short Notice of the Mode of Treatment adopted.

By Assistant-Surgeon W. T. Martin, M.D., 45th Regiment.

Neemuch.

The military cantonment of Neemuch is situated 1,476 feet above the level of the sea, in latitude 24° 27′ N., longitude 74° 54′ E., in the territory of Gwalior, on the north-west border of Malwa, and a short distance from the

boundary which separates that province from Meywar. It is about 150 miles north-west from Mhow, and about the same distance south of Nusseerabad, thus occupying a central position on the line of communication between these two important stations.

A road is in process of construction between Neemuch and Mhow; but at present there is merely a cart-track, which is all but impassable during the rains. The Neemuch Brigade is included in the Mhow Division of the Army, the hospitals of which division are under the control of an officiating Deputy Inspector-General of Hospitals.

Description of the Cantonment.

The cantonment of Neemuch is about two miles and a-half long by one and a-half broad, and is enclosed between two streams (nullahs) which contain running water nine out of the twelve months. These nullahs are flushed by the rains periodically,—a matter of great importance, as, notwithstanding stringent orders, the natives frequently resort to them for purposes of nature. The cantonment is bisected by a ridge running from N.N.W. to S.S.E., sloping gradually on either side towards the nullahs above mentioned. The surface is chiefly red soil, resting on trap-rock, but "a belt of cotton soil encircles and indents the camp." These indentations are most extensive about one mile from the north-western limit of the cantonment, and it is in their immediate vicinity that the present Infantry barracks are constructed, having a large tract of cotton soil to windward.

Commencing at the north-western extremity of the ridge, we find a large, open, elevated plain,—the Brigade Parade Ground. This has been recommended as the proper site for new barracks, and appears well suited for the purpose. Passing eastward, we find the ground sinks towards the indentations of cotton soil above alluded to. On the south-western aspect of the ridge is the race-course. On the north-east we find the patcherries, the garrison cells, and Infantry barracks, with their out-offices. On the same north-eastern aspect of the ridge follow in succession the Native Infantry lines (kept in a highly creditable state of cleanliness), the Artillery hospital with detached quarters on either side for barrack officials, huts and horse-lines of Native Cavalry, and, lastly, the horse-lines and barracks of the Royal Artillery.

Facing the Infantry barracks, and on the south-west aspect of the slope, is the Fort or fortified square, having behind it the Commissariat garden. Passing south-east from the Fort, we meet private bungalows, the Infantry hospital, which is situated on an elevated and open maidan (or plain), and, lastly, the Station Bazaar. The officers' bungalows are situated principally about the centre of the cantonment, running from N.N.W. to S.S.E. in three and sometimes four rows, between the Native Infantry and Cavalry lines on one side and the open maidan and bazaar on the other. These bungalows are, as a rule, good, situated in more or less extensive compounds. The station is well-wooded, and looks very pretty, particularly after the rains.

The station bazaar occupies a considerable portion of the south-east corner of the cantonment, and lies to windward of the Artillery barracks during the prevalence of the south-west monsoon.

The natural drainage of the station is good, and, within the last two years, much has been done by the Brigade authorities to improve it, by cutting large drains leading to the nullahs. Water was found, during the rains, to lodge near some of the Infantry barracks, and I thought it necessary to recommend extra drains.

The water-supply is good from very numerous well-built wells. Those situated on the ridge between the Infantry barracks and fort were the best, as contamination by surface impurities was out of the question. These were cut through the trap-rock to a depth of 20 feet and more. The physical qualities of the water were good, but no means of chemical analysis were available. The water was distributed in the usual Indian way,—by hand-labour. The drinking-water was passed through temporary filters containing gravel and charcoal.

Vicinity of Neemuch.

The country, within a distance of five miles, is undulating; and to the south-west and north, at distances varying from one and a-half to five miles, are a succession of elevated ridges of red gravel and trap-rock, whose general direction is from north to south. As will be seen hereafter, these ridges proved to be admirable sites for sanitary camps. Large tracts of cotton-soil also exist,

which are cultivated. Poppies and cereals are the chief products; and it is to me a doubtful point whether the extensive irrigation of the poppy-beds is a source of malaria or not. The only tanks in the station are situated in the Commissariat garden and bazaar, being formed by damming up one of the nullahs. I cannot think that they have exerted a prejudicial effect on the health of the station. There are three or four small tanks within a distance of a couple of miles.

The native town of Neemuch is situated out of cantonment limits, about half a-mile in an easterly direction from the Royal Artillery Barracks. It is said to contain 8,000 inhabitants. Scattered about the surrounding country are small villages. The only one of these that I think is particularly objectionable is Nixon-gunge, which is situated half a mile to windward of the station. It is occupied by all the refuse of the bazaar, is dirty in the extreme, and, moreover, is generally considered to be the source of much of the pernicious native liquor. Being in the territory of a native prince it is free from control.

There are numerous Mussulman burial-grounds near Neemuch, but I never detected any nuisance from them. The European burial-ground is a quarter of a mile to leeward of the nearest barracks, but I am not aware of any injurious effect therefrom.

Climate. The climate of Neemuch varies with the seasons (and, from what I can learn, is very different in different years). During the cold season, from November to the middle of February, the weather is cold and bracing. From February to June the heat increases, reaching its maximum in May, when fierce hot winds blow throughout the day, rendering tatties essential to comfort. The nights vary from cold, in December, to comparative coolness in the hot season. Even during May, it is possible to obtain a refreshing rest by sleeping in the open air, as is done by almost all the officers in the station. The rains usually commence about the middle of June, and last, with occasional breaks, till September. The weather in the monsoon is considered mild and pleasant. In October the heat again increases, decreasing towards the end of the month.

The seasons of 1865 have been unusual in many respects. The hot season has been of an exceptionally trying nature, and very protracted. The rains were later than usual, and light.

The thermometer in the shade, at 4 P.M. about the middle of April, indicated 104°, reached 107° towards the end of the month, and 110° on the 21st May, at which height it continued several days. Then it was that cholera broke out in the wing for the first time. The weather became cooler in June, and a few showers fell at the end of that month and the beginning of July.

The real monsoon weather did not commence till the 1st August, the total rainfall being only 25 to 26 inches, instead of the average 37 inches. The heat, during September and October, was considerable. The wind was very unsteady during these months, and the weather, at times, was awfully close and oppressive.

The prevailing wind during the eight hot months is S.W. and W. During four cold months, N.E.

Barracks occupied by the Wing 45th Regiment. The Neemuch Infantry barracks were hastily constructed in 1858, after the Mutiny, for temporary occupation; yet, notwithstanding repeated condemnatory reports, they still stand, having cost large sums of money to keep them in anything like good repair. The barracks are noted for their unhealthiness throughout the Bombay Presidency. The 95th and 106th suffered in them; and though the 103rd, in 1864, had but a slight mortality, the effects of Neemuch fever still clings to the regiment. The accommodation for the single men consisted of six and a-half single-storied blocks, or bungalows, with verandahs on either side. Small rooms were partitioned off the end of the verandahs for the non-commissioned officers. The bungalows ran from N.N.W. to S.S.E. in three rows *en échellon*, thus fairly exposed to the south-west wind. The dimensions of each main room were as follows:—Length, 200 feet; breadth, 24 feet; height from floor to top of wall 15½ feet; mean height of floor from surrounding ground 1½ feet.

The average number sleeping in each barrack-room, in the cold season, was 58, in hot season, 51, and in July and August, 48. Thus the superficial area per man varied from 80 to 100 square feet. The arrangement of the beds was attended to.

Each main room was lighted and ventilated by twelve windows and four doors on each side, placed opposite to each other. The windows were on hinges, and opened inwards. In addition to these, there were twelve small openings covered with wire gauze 1′ × 1′ on each side, just under the wall-plate; but I was always of opinion that these openings did little good.

The ventilation by doors and windows was so far good; but to ensure proper ventilation at all times a considerable portion of the ventilating means should be out of the control of the men. The barrack-rooms (as well as the hospital and married quarters) were cooled during the hot season by kus-kus tatties kept constantly wet.

The floors were flagged. In the monsoon they were found to be damp, and on removing flags they were found, in some of the bungalows, to rest on wet, black earth. The elevation of the floors above the ground was not sufficient.

It is needless to expatiate on the defects of the barracks, as they are quite notorious. (Vide Sanitary, Statistical, and Medical Reports for the year 1860, page 280; for 1861, page 284).

Washhouses and Urinals. The wash-houses were temporary erections of bamboo covered with thatch; and in one end of the shed, separated by a partition, were placed two large globular-shaped iron vessels as urinals. The waste water and urine were removed twice daily by hand-labour. These sheds were wretched in the extreme, and placed, in some instances, to windward of the bungalows. Their objectionable nature was brought to the notice of the authorities through the Commanding Officer, but without effect, as a new system of conservancy was expected to come into force.

Latrines. The latrines, which were well-built and well-ventilated, were to leeward The seats were of stone, and the bottom of each seat an inclined plane, ending in an opening in the back wall, through which the sweepers removed the filth *dry*. The urine ran down the inclined plane, and was conducted through a channel into a covered cesspit, from which it was regularly removed daily. A screen-wall protected the openings in the back wall. Lime was freely used, and charcoal was frequently burned in the latrines. The above was the standard plan in the station. I have rarely seen latrines better kept than these were, owing to constant supervision.

Disposal of the Filth of the Station. The filth of the barracks and station generally was removed to a site some distance out of cantonments, so situated as to be, with rare exceptions, to leeward of the station. Here the refuse was ordered to be burned.

Cook-houses. The cook-houses were good, as these buildings go in India, and the cooking was fairly done by native cooks.

Rations. The rations were, on the whole, good. Good beef was issued every day except Thursday and Sunday, when mutton was substituted. The latter was rather thin and poor during the hot season. The supply of potatoes was excellent part of the year, but during the monsoon the quality deteriorated, and was so bad in September that their use had to be discontinued for some weeks, bread being issued instead. Onions were good and plentiful throughout the year. Pumpkins were also plentiful, and cabbages were issued in the spring.

The men bought little extras to supplement their rations. The bread was, as a rule, excellent. Its quality was not so good in May; but after a little correspondence, the defect was remedied.

Canteen. The canteen supplies were of fair average quality. Each man was entitled to a glass of arrack and a pint of porter per diem. Many of the men did not draw their full allowance.

The porter was issued at and after the dinner hour, and was generally of very good quality.

The spirit-ration was issued to those who drew it, in the evening. As a rule, the men were not intemperate; but on two or three occasions the amount of intemperance largely increased, particularly during the second outbreak of cholera. I cannot say that the drunkards were particularly singled out by cholera, but certainly to the direct effects of drink may be ascribed three out of the four deaths from sunstroke.

Library and Means of Recreation. A library and reading-room, with a coffee-shop attached, was supported by subscription. Many availed themselves of this institution, which was under the supervision of an officer. Small games, such as draughts, dominoes, and bagatelle, were provided. The principal out-door games that the men indulged

in were cricket, quoits, skittles, and long bullet. The estimates for a fives court were sanctioned just before the wing left the station. The men got up athletic games occasionally, which appeared to afford much amusement. A few men availed themselves of permission to shoot. Owing to the necessary confinement during the hot season, the life must have been extremely monotonous.

Clothing. The clothing was suitable to the climate and seasons. Great pains were taken to alter the dress according to circumstances. During the hot season white cotton clothing was worn; in the rains, loose serge tunics and blue cloth trowsers. When the temperature of the nights was low, the guards were mounted with woollen clothing and great coats. Helmets were used from sunrise to sunset. Two flannel shirts formed part of each man's kit, as well as two cholera-belts. During the rains the means of drying wet clothing was insufficient and unsatisfactory. I represented the matter to the Commanding Officer, but the authorities would not sanction the necessary expenditure from Government funds. The officers of companies remedied the defect to a certain extent.

Duties. The duties at Neemuch were light. The parades during the hot season were few and short, and took place early in the morning, before sunrise.

The men had an average of eight nights in bed.

Accommodation for the Married People. The married people were accommodated in four blocks of patcherries. They had ample space and were comfortably housed. The sanitary condition of the patcherries, with their offices, was most closely looked after, and was very good indeed. The great difficulty was to get the women to give themselves a sufficient quantity of fresh air at night.

Hospital. The hospital, situated a mile from the barracks, was an imposing-looking building, formerly the Residency, double-storied; but the upper wards could not be occupied from February to June, owing to the radiated heat from the roof, which was of stone. This was very unfortunate, as the best and airiest wards were thus unavailable.

Subjoined is a tabular statement of the hospital accommodation, in which will be seen at a glance the number of wards available in the different seasons, their superficial and cubical space, the number which the wards were calculated to hold, and the maximum number actually placed therein. It will be observed that at no time was there overcrowding. The hospital has many defects of construction which interfere with its proper ventilation, and which, moreover, render it unsuitable for a large sick-list. No nuisance was experienced from the latrines, which were situated some distance on the flank of the hospital, connected thereto by a covered passage. The cesspit for urine was emptied, and the night-soil removed *dry* about 4 A.M. daily.

The ablutionary means were sufficient; the cooking well done.

The wards were cooled by tatties during the hot season, and the ventilation (which was by doors and windows) aided by punkahs.

The female hospital was on the flank of the hospital. It did not afford sufficient accommodation during the sickly season.

The sanitary condition of the hospital was carefully looked after.

Bazaar. The bazaar was kept in a fair state of cleanliness; but, notwithstanding that latrines were provided, many of the natives resorted to the adjacent nullah and neighbouring country for purposes of nature. As the direction they went in, however, was never to windward of the station, no ill consequence was observed.

The conservancy of the station generally was fairly attended to, but, as in all Indian stations, there was room for improvement.

The new dry system of conservancy is expected soon to come into operation; when it does it will be a vast improvement.

Previous Medical History of the Wing 45th Foot. The left wing H.M.'s 45th Regiment, composed of Nos. 2, 3, 5, 6, and 10 Companies, in all 13 officers and 430 non-commissioned officers and men, under the command of Major R. B. Johnstone, arrived at Neemuch on the 10th January, 1865. Having landed in Bombay on the 2nd November, 1864, after a prosperous voyage from Ireland of 93 days, in the "Donald McKay," the wing was ordered up to Neemuch. It left Bombay by rail for Nargaum, a distance of about 300 miles, in two detachments, starting on the 16th and 24th November respectively.

At Nargaum there was a delay of a few days, getting carriage, &c., and the

entire wing commenced its march on the morning of 5th December, 1864. The health of the men, women, and children was at this time decidedly good, and continued so up to the date of arrival at Neemuch. The principal ailments on the march were fevers, mild dysentery, diarrhœa, and colic; the latter caused by the men eating every sort of fruit, wholesome or unwholesome, that they came across. Stringent measures were taken to prevent this, and with the best results.

The wing was composed of a large majority of young men of short service, very many of the fine old Cape soldiers having taken their discharge before the regiment embarked. There appeared to me to be the materials for a first-rate corps if these youngsters could have been formed at a healthy station. The result of sending them straight to Neemuch has been very disastrous, for not only has there been excessive mortality, but a large number of the men have got the seeds of malarious fever in their constitutions, which they will not get rid of for years, if ever. It is amazing the ignorance of the commonest laws of health displayed by both officers and soldiers on landing in India. They scoff, many of them, at the advice of old Indians. That this ignorance tells on the health of newly-arrived regiments there can be no doubt; and for this reason they should be, in my opinion, sent to the most salubrious stations on arrival, to learn what sort of climate they have to deal with.

The wing, on its arrival in Neemuch, was very healthy, only seventeen in hospital, and many of these very trivial cases, such as footsores.

It continued in this satisfactory state till April, in the middle of which month, owing to the excessive heat, there was a large number of admissions for ardent continued fever, the prominent symptom of which was intense headache. The duration of the disease was generally short, but the consequent debility was great and lasting. As the heat continued excessive during May, not only did the sick-list continue high, but the men, women, and children became very weakly, and looked thoroughly washed out.

The Brigadier-General remarked to me the wonderful change that had taken place in the men's strength and appearance during the interval that had elapsed between his "marching-in" inspection and the brigade parade on the Queen's birthday (24th May). He remarked, that "he could scarcely believe they were the same men." And in truth the change was only too obvious. It will thus be easily realised how predisposed the wing was to the invasion of an epidemic.

Prevalence of Cholera in surrounding Districts.

The sanitary condition of the wing was always considered by me as of the most vital importance, and, with Dr. Barker's able assistance, I was constantly on the look-out for anything that might prove prejudicial to the men's health, with a view to remedy it. In the beginning of May it was known that the cholera prevailed in the surrounding districts, and, according to rumour, in the station bazaar.

Preventive Measures adopted.

Dr. Barker and I therefore redoubled our exertions, so that, should the scourge visit the wing, it would not be through any neglect on our part.

Extreme cleanliness of the latrines, &c., was insisted upon.

The filtration of the water was attended to, as well as the source of the water-supply. The rations were constantly inspected, and the men were forbidden to enter the bazaar except in cases of necessity. The non-commissioned officers and men were warned of the extreme importance of receiving early treatment for diarrhœa, however mild. Between the 15th and 23rd May, three or four dropping cases of cholera were reported amongst the natives in the station, and the Staff Surgeon took the necessary steps to isolate such cases as much as possible.

History of the first Outbreak.

I shall now proceed to describe the first outbreak in the wing.

Its commencement.

On the morning of the 24th May, 1865, cholera broke out for the first time in the wing. The first person attacked was a weakly man in the centre ward of the hospital, who had been under treatment for some days for obstinate diarrhœa. About 3 A.M. symptoms of cholera set in, and he died collapsed at 11 A.M. same day. At 7 A.M. an old, weakly, married man from No. 5 Company's patcherry (about one mile and a-quarter distant from the hospital) was admitted with vomiting and purging. He soon became intensely collapsed, and died at 2 P.M. His wife stated that he had been first attacked about 3 A.M., so that both cases appear to have occurred almost simultaneously.

During the day, a patient who had been in the same centre ward as the first case, and a man from No. 10 Company's barrack-room (half a-mile from the patcherries) were attacked, almost simultaneously, with cholera of a most malignant type. *Measures adopted.*

The following measures were promptly carried out:—

1. A wing of the hospital was cleared out for the reception of cholera cases, and isolated as much as possible from the rest of the building.
2. A separate ward was assigned for the observation of diarrhœa cases.
3. A trench was dug to receive the cholera stools and vomit, which were immediately buried.
4. Chloride of lime (the only disinfectant then at hand) was freely used.
5. The ward in which the two cases of cholera had occurred was speedily evacuated and closed. It was lime-washed and fumigated without delay.
6. Ordered the wells which supplied the barracks and hospital to be changed.
7. Following the recommendation of the Sanitary Commission, I discharged all the patients I possibly could for out-treatment, thus reducing the number in hospital very considerably.

The weather at this time was intensely hot. The thermometer indicated 110° in the shade at 4 P.M. On the night of 23rd, it was noticed that the wind shifted to the east and south-east. *Atmospheric Conditions at the time.*

Owing to the intense heat, and thinking that the cases which had occurred would prove to be sporadic, from their being so scattered, I did not feel justified in recommending the removal of the wing to tents. I, however, advised that the several departments should be warned to have carriage and tents ready at a short notice, which was accordingly done. *Reasons for not moving the Wing immediately under canvas.*

On the 25th May, no cases occurred; but on the morning of the 26th, a married man from No. 5 patcherry was admitted, and died collapsed in a few hours. I recommended that the entire block of patcherries should be vacated and purified, the families being located in a spare barrack-room. A marquee was pitched near the hospital, for cholera cases. *Progress of the Epidemic.*

An ordnance-serjeant, occupying a detached bungalow a quarter of a mile distant to windward of the patcherries, was also attacked with cholera on the night of the 25th, and died on the following morning. No cases occurred on the 27th; but, on the evening of the 28th, a man was admitted from No. 3 Company's barrack-room. Case proved rapidly fatal.

On the 29th, a married man of No. 5 Company, who had shifted his quarters on the 26th, was admitted, and speedily sank.

A woman from No. 2 patcherry was admitted about mid-day, and died the following morning. Diarrhœa, which, at the commencement, was rare, now became more frequent, and a couple of children suffered from mild choleraic diarrhœa.

Medicines were distributed in the barrack-rooms, and the non-commissioned officers were again warned to send men ailing for treatment. During the night of the 29th, another woman and child were admitted from the patcherries; so that, early on the morning of the 30th, I recommended that the married people should all be encamped on the brigade parade-ground, about a mile distant, and in a direction at right angles to the wind.

I confess that to this day I cannot account for the disease fastening itself on the married people in the way it did. Before and during the epidemic the patcherries and offices were frequently inspected by Dr. Barker and myself, and we could not detect any obvious sanitary defect.

To return, however, to the narrative. Everything was ready to move out the families during the day, but between the hours of 8 and 9 A.M., two men from the lines and one from the patcherries were admitted with cholera. I could not any longer hesitate in the course to be pursued, but at once recommended the removal of the entire wing from the cantonment to a site previously selected, about two miles distant in a westerly direction. *Number of Cases increase rapidly. Recommended the removal of the Entire Wing.*

An ordnance-serjeant (occupying detached quarters near the serjeant who was attacked on the 26th) and Assistant-Surgeon Joyner, Royal Artillery, were attacked with cholera and died this day; both extremely malignant cases. *Progress of Events.*

During the afternoon, tents and a fatigue party were sent out; and at 7 A.M. the following morning the entire wing, with the exception of the sick and a small

fatigue party, was under canvas, in temporary charge of Dr. Barker. Shortly after its arrival, however, one man, a woman, and a child were attacked; and during the day, a man who had foolishly exposed himself died of sunstroke.

In the evening I joined with the sick and hospital establishment, having left the cholera-sick and necessary servants under the charge of Assistant-Surgeon Bruce, 2nd Light Cavalry.

Description of the Camp. The camp was pitched along an elevated ridge of red gravelly soil running N.N.W. and S.S.E., at right angles to the prevailing south-west wind. The tents were placed *en échellon* as scattered as possible, sufficient intervals existing between the hospital, patcherries, and men's tents.

Half of the walls of each tent were removed during the day, the other half being left up for the sake of shade.

There was no overcowding, ten men and three families occupying a single-poled tent, instead of the regulation number of fourteen men and four families.

Latrine trenches were dug some 60 yards to leeward, and covered with Rowtie tents. From these the filth was removed at frequent intervals, and buried in deep trenches dug at a considerable distance to leeward.

The latrine trenches were filled in and new ones dug every third or fourth day.

The conservancy of the camp was closely looked after, and the sweepers did their work well owing to the untiring energy and zeal of the corporal of pioneers. (This man was promoted for his good conduct).

Arrangement of the Hospital Tents. The hospital was placed some distance on the flank of the camp, the marquees being pitched in very open order. Those to windward were occupied by the ordinary sick. A special marquee was set apart for the observation and treatment of diarrhœa cases, and all cholera patients were *immediately* isolated in a marquee pitched to leeward. A single-pole tent, still further to leeward, was used for the reception of the dead. The hospital latrines were to leeward, and a special trench was dug to receive cholera stools and vomit.

Water Supply. A sentry was posted over the well which yielded the best drinking-water, which was, moreover, filtered before use.

Medicines distributed. Medicines were sent round the tents, and every encouragement given to the men to apply early for treatment.

Sleeping accommodation. Hospital cots were brought out for the use of the sick. At this season it was considered unnecessary to bring out the men's sleeping-cots.

One dram of arrack issued in lieu of Porter. As it was impossible to keep the porter sound, a dram of arrack was substituted. The duties under canvas were exceedingly light.

Progress of Events. During 1st, 2nd, and 3rd June everything looked satisfactory. No fresh cases of cholera occurred, and a marked improvement in the appearance and spirits of everybody was noticed. During the night of the 3rd and morning of the 4th June, the weather became very sultry and oppressive, and the wind shifted to the south-east. A haze was observable all round. Between 8 A.M. and 4 P.M., four cases of cholera presented themselves, three of which proved rapidly fatal. The weather cleared on 5th, 6th, and 7th, and during these days only one case occurred. I should mention that every tent in which cholera cases occurred was forthwith struck and repitched on fresh ground. Moreover, clothing and bedding soiled by cholera patients were immediately burned.

A fresh case having occurred on the 8th June, I recommended the removal of the wing to a new site, about a mile and a-half distant, in a direction partly to windward, partly at right angles to the wind. This change was carried out; but, at the time of shifting, three men were attacked. The disease proved milder, and two survived. This second camp was pitched with every possible regard to sanitary laws; and, from the peculiar shape of the ridge, I was able to thoroughly isolate the hospital, men's tents, and patcherries. The latter were some distance off, and an apothecary was sent to be constantly at hand with medicines. Medical comforts, as wine, arrowroot, &c., were given freely to men, women, and children that required them.

Water-supply at this camp was good and abundant.

Decline of the Epidemic. The last case of cholera during this epidemic occurred on the 11th June. A strumous child, who had been suffering from mild dysentery for some time, became suddenly collapsed, and died on the morning of that day.

From this date forward, a most remarkable improvement took place in the general health of the wing. The weather, though still hot in the daytime, became cool and bracing during evenings, nights, and mornings. The wind blew steadily from south-west and west.

Return of the Wing to Cantonment.

On the 20th the married people returned to Neemuch, and, on the 21st, the hospital and sick. It was my original intention to have the men brought in on the 22nd, but a case of cholera having been reported in the station on the 21st, it was determined, in consultation with the Senior Medical Officer, Assistant-Surgeon Bruce, and the Brigadier-General, that they should remain out some time longer, until the rains should set in. Assistant-Surgeon Barker remained in charge of the men under canvas, with a small hospital establishment, whilst the hospital and families were under my care in the station. The health of the wing was at this period wonderfully good. The men looked brown and robust, and every one was in capital spirits. The sick numbered only twelve or thirteen.

Health of the Wing good.

Rain having fallen on the 27th, and the monsoon appearing imminent, the wing returned on the 28th June.

Vacated buildings purified.

During the absence of the wing from cantonments, the barracks, patcherries, and hospital underwent a most thorough cleansing. The walls were lime-washed, the woodwork washed with a weak solution of chloride of zinc, and every room was fumigated with nitrous acid, under the supervision of Dr. Bruce and myself.

Prevalence of Cholera in the surrounding Districts.

I regret to say I cannot speak with accuracy as to the extent to which cholera prevailed in the surrounding districts. In April, it prevailed chiefly in places south of Neemuch, then spread northward, and about the beginning of June, broke out with much virulence in the Nusseerabad Brigade. Native officials reported that the deaths from cholera amongst the natives of the districts surrounding Neemuch were frightfully numerous, and whole villages were deserted in consequence. It is worthy of remark that the D Brigade 18th Battery Royal Artillery, 2nd Native Cavalry, and H.M.'s 8th Native Infantry, continued quite free from cholera during the month of June.

A few cases, however, occurred in the station bazaar; and on the 21st the wife of the barrack-master, and, on the 22nd, the widow of an ordnance serjeant (both occupying quarters in the immediate vicinity of the Artillery hospital) were seized, but recovered.

Health of the Wing during July and August.

The wing continued healthy until the end of July, when a tendency to whitlows and blind boils was observed. The rains set in regularly in August, and during this month all the benefit derived from camp before June was more than lost. The imperfections of the barracks became more glaring,—leaky roofs, damp floors, insufficient means for drying wet clothes, and want of exercise, amongst other causes, told unfavourably on the health of everybody, and I find the following remarks in my diary:—

"August 21.—Health of women and children very unsatisfactory. Diarrhœa, mild dysentery, and general debility the prevailing diseases. Men, generally, looking washed-out and delicate. Intermittent fever, diarrhœa, and mild dysentery the prevailing diseases."

Sporadic Case of Cholera in the Wing.

On July 1st, the wife of a serjeant of the 45th was attacked with cholera. She went to the bazaar with her husband, contrary to orders, partook of some fruit and lemonade, and was seized with vomiting and purging within half an hour, became collapsed, and died. The following steps were taken to prevent the disease spreading. Patient placed in a separate ward; chemical disinfectants freely used; stools and vomit buried; quarters vacated and purified; disinfectants used in patcherry latrines; order forbidding the men and women to enter the bazaar, or to eat fruit, republished.

The patcherry this woman lived in had escaped previously, and was in an excellent state of cleanliness.

Epidemic of Cholera in D Battery 18th Brigade Royal Artillery.

Cholera broke out in the D Brigade 18th Battery Royal Artillery 20th July, and carried off some victims. The battery was moved out, and the disease disappeared. During the outbreak in the Royal Artillery, all communication on the part of our men with that end of camp was cut off except in case of necessity or duty.

Second Sporadic Case of

On 20th August a sporadic case occurred in the wing, which, however, ended favourably. Every precaution was taken to prevent the disease spreading.

Cholera in the Wing. Cases in the Station. On the 28th August a sporadic case occurred in the Artillery; and about this time, also, the wife of a private in the 8th Native Infantry died of cholera. It will thus be seen that, since the 15th May, the station had not been quite free from cholera for any considerable time.

Health of the Wing, at beginning of September, very unsatisfactory. The sick-list rose rapidly during the first week in September, reaching its maximum of 54 on the 6th. About this time, also, mild ophthalmia spread like wildfire through the children of the wing, their parents, and, in a few instances, to the single men.

Second outbreak of Cholera in the Wing. The health of the wing being in this extremely low and unsatisfactory state, cholera broke out, for the second time, in an epidemic form, on the night of the 7th September.

It was observed on the 6th and 7th, that diarrhœa became very prevalent, without any discoverable cause. About 9 P.M. on the 7th, a man was admitted with cholera from No. 5 Company barrack-room. He was placed in an isolated ward and the usual precautions taken.

The same night two weakly men, in different wards of the hospital, were attacked and died the following day.

Measures adopted. I recommended the evacuation of the hospital without delay, and, by 8 P.M. on the 8th, all the patients, with the exception of those suffering from cholera, were encamped about two miles from the hospital and one from the patcherries, on the brigade parade-ground. As many patients as were fit to receive treatment out of hospital were discharged.

A case occurred during the day in No. 6 Company's barrack-room. I recommended that Nos. 5 and 6 Companies should be moved out as soon as possible, to be followed by the remaining three companies. The families having escaped so far I determined not to remove them.

The wells were changed and the filters attended to. Medicines were distributed freely amongst the men, who were again warned to apply in time for medicine. On the 9th September, a patient in hospital (under canvas) was attacked and soon sank. During this morning Nos. 5 and 6 Companies moved out, followed, on the 10th, by the remaining companies.

Plan of Camp. The same general plan was adopted in this as in previous camps, viz., the hospital was some distance on one flank; the hospital marquees pitched in open order *en échelon*, the freest ventilation being insisted upon. One separate marquee was set apart for the observation and treatment of diarrhœa cases. Single-poled tents, accommodating a maximum of three cots, were pitched well to leeward for cholera patients; and, still further away to leeward, was a tent to receive the dead. Separate attendants, and separate drinking vessels, &c., were set apart for the cholera wards. Cholera stools and vomit were immediately buried. All the sick were provided with cots.

The men's tents were pitched in two lines *en échelon*, in very open order, the long axis of the camp being at right angles to the prevailing south-west wind. During this epidemic, every man was provided with his cot. Latrine trenches covered with Rowtie tents were dug well to leeward, and kept in a highly satisfactory state of cleanliness, the filth being removed and buried at frequent intervals.*

The men had even more space than in June, only seven or eight men occupying a single-poled tent.

Progress of the Epidemic. The 10th, 11th, 12th, and 13th September passed without any fresh cases; but, on the 12th, heavy rain fell and the weather became hot and stifling, the immediate result of which was a large increase in the number of diarrhœa cases. On the morning of the 14th, two cases of cholera occurred in No. 5 Company. Several of the men in Nos. 5 and 6 Companies received treatment for watery diarrhœa. I inspected No. 5 immediately, and found the men looking pale, weakly, and depressed in spirits. Close enquiries were made as to the existence of any assignable cause for the diarrhœa, and the water in the filters examined, but all with negative results.

A minute examination of the barracks occupied by this company was also made, but no obvious cause for the great sickness in the company could be discovered. The immediate removal of Nos. 5 and 6 Companies was recommended and carried out, and also the removal of the hospital and remaining companies on the following day (15th). The new site was about two miles to the south of the cantonment, and about three and a-half to four miles

from our first camp. It was elevated and freely exposed, the soil of a red gravelly nature,—in fact, admirably suited in every respect. The families were placed under the charge of Assistant-Surgeon Bruce, and a medical subordinate was detailed to remain constantly near the patcherries, in a tent pitched for his reception, with a proper supply of stimulants and medicines. Two further cases occurred at the old camp on the evening of 14th, making four cases in all on that day. *Arrangements relative to the Patcherries.*

Weather very close and muggy. Wind W.S.W. and variable. *Progress of Events.*

The change on the 15th exerted a good influence on the spirits of everybody. Only one case of cholera, and that the incipient stage, was removed from our first to the second camp. On the 16th, there was one case amongst the men; but, during the night of 15th, a woman was attacked in the patcherries, and, at the recommendation of Assistant-Surgeon Bruce, the married people were without delay put under canvas on a rising knoll about a quarter of a mile distant from one camp. The greatest depression of spirits existed amongst the women, and nearly every woman and child in the wing was receiving treatment, bowel-complaints and ophthalmia being the prevailing diseases. As little communication as possible was allowed between the two camps, in order to prevent the ophthalmia spreading. *A case of Cholera occurs in the Patcherries, and the families moved out.*

The night of 16th was very close and oppressive, and the wind shifted to north-east, and variable. *Progress of Events.*

On the 17th September, the wife of one of the colour-serjeants was attacked with cholera. She had accompanied her husband under canvas, and lived near the men's camp. The same day two men were attacked, but the type of the disease appeared milder.

On 18th, the hospital and men's camp was moved to an elevated ridge three-quarters of a mile distant, partly to windward, partly at right angles to the wind. The married people's camp remained as it was. About this time the potatoes became very bad; and, as they were unfit for food, bread was substituted at my request. *Third Camp.*

During the 18th and forenoon of the 19th, everything went on well. The weather was clearer and the wind steadier from the west, the sun during the day being very hot.

On the 18th I recommended that drinking-water should be boiled before filtration, which was done as soon as possible in large boilers, the existence of which was discovered by chance. *Drinking-water boiled before filtration.*

About 6 P.M. on 19th September, the weather was observed to change in a remarkable manner, and both Dr. Barker and myself expressed our apprehension that we would have fresh cases. The wind—what little there was of it—shifted to east and south-east, the air felt close and stifling, the sky was clouded, and there was much thunder and lightning. At 10 P.M. a man was admitted, followed, early the next morning, by two others. The type of the disease, at this time, became again intensely malignant, the duration of each of the three cases being under twenty-four hours. *Atmospheric Conditions on 19th September.*

Seven or eight men came to hospital on 20th September with pseudo-choleraic symptoms, caused by eating the seeds of the wild castor-oil plant. Two of the cases were particularly severe, but after twenty-four hours' detention and treatment, they went out apparently quite well. *Men attacked with pseudo-choleraic symptoms from eating Castor Oil Seeds.*

21st September, two admissions for cholera, one from the lines; the other was a patient in an advanced stage of phthisis.

22nd September, two attacks, one being a fine young man who had eaten the poisonous seeds on the 20th. *Progress of Events.*

23rd.—Another of the foolish men who had eaten the seeds was admitted with genuine cholera.

On 22nd, the married people, at my recommendation, moved from their first camp to an elevated ridge about three-quarters of a mile from our third camp. *Fourth Camp.*

The men's tents and hospital were removed, on 23rd, to a different portion of the same ridge. The hospital, married people's tents, and men's tents were pitched wide apart, the latter in two lines at right angles to the wind.

During night of 23rd, two patients in hospital, suffering from dysentery and peritonitis respectively, were attacked.

On 24th, one attack,—a man from the lines. The type, again, somewhat milder.

On 25th the disease again increased in virulence, and this time the patcherry suffered. Two married men were also admitted from the lines from different companies. The disease was frightfully malignant, killing in the cold stage, after the lapse of a few hours.

Fifth and Sixth Camps.

26th.—The wing moved one mile; and on 28th, at my recommendation, the entire wing moved about four miles, principally in a direction at right angles to the wind. This, which was our last camp, was one of the best. The hospital was pitched on an elevated ridge by itself, about a quarter of a mile in a direction at right angles to wind. The men's tents were situated on a well-elevated ridge; and, about half a mile further off, the married people were located. As the latter were thus some distance off, I detailed a medical subordinate to remain constantly at hand.

The well that supplied this camp was cut through solid rock, and yielded admirable water. As hitherto, the strictest attention was paid to the conservancy and sanitary condition of this camp, which was situated about five and a-half miles from Neemuch. We had, in fact, gone round from the south to the west of Neemuch, at distances varying from two to three or five and a-half miles.

29th.—A man who had been ailing for some days was brought to hospital with cholera. This man had concealed his disease, though he acknowledged he had received frequent warnings on the subject. The weather on this evening was close and oppressive; north-east horizon clouded; much lightning and thunder; and we were not surprised that two fresh cases should occur the following day. These, the last cases during this epidemic, were extremely malignant, and proved fatal in the algide stage

Cessation of the Epidemic.

Very heavy rain fell on the 2nd October, and the weather felt perceptibly clearer and fresher. Bilious remittent fever became prevalent at this time; and in the greater number of the cases of cholera that survived the first shock, the reactionary fever assumed a bilious remittent type. The women and children were suffering much from diarrhœa, dysentery, and malarious fever, very few being in even tolerable health.

Sickness in the surrounding Districts.

The number of men receiving treatment daily was from seventy to eighty; and, in fact, the health of the wing was extremely bad.

After a careful investigation I could not discover that cholera prevailed in the villages in our neighbourhood, but sickness of a most malignant type was raging in them; and from official sources I learnt that, for twenty years, there had not been such a fatal year amongst the natives. The disease, from the description I received, appeared to me to be a very malignant form of bilious remittent fever with visceral complications. Black vomit was not an infrequent symptom I was told. I examined the sick of one village in particular in which frightful mortality occurred, and found the greater number of sick suffering from fever, with considerable gastro-hepatic complication. As no suitable treatment was within their reach, large numbers died.

I cannot state positively that cholera did not exist in the surrounding native districts at this time, but it was known that a serious epidemic of that disease had attacked the Nusseerabad brigade a second time.

Health of the Wing.

Return of the Wing.

On 5th October, I was able to report a decided falling-off in the number of bowel disorders; and, as the fever-list was rising, I recommended the return of the families on 9th, hospital on 10th, and men on 11th October. This arrangement was carried out, the barracks, patcherries, and hospital having been, during our absence, thoroughly lime-washed, cleansed, and purified. The station had been entirely free from cholera during the latter half of the month of September.

On the return of the wing the men's spirits rose; but I must say the general health of men, women, and children was still much below par.

Atmospheric Conditions, and final Outbreak of Cholera.

The weather on 11th, 12th, and 13th was such as has been described before, viz., close, dull, and oppressive, sky clouded, wind variable, much lightning, very high barometer. On morning of 13th October, cholera again broke out with undiminished virulence. Three men were attacked the first day, one from No. 6 Company's barrack-room, who had been loose the previous day whilst playing cricket; the second became suddenly collapsed whilst on the Fort guard, and the third from No. 5 Company's barrack-room.

The sick-list at this time numbered seventy, twenty of whom were suffering

from ophthalmia, and were located in two large marquees pitched to leeward of the hospital.

I broke up the hospital, as on previous occasions, reducing the number in hospital to forty-eight. The cholera cases were treated in tents on this occasion, and every precaution was adopted to prevent the disease spreading. *Measures adopted.*

I felt loth to recommend the removal of the entire wing to tents again, owing to the prevalence of a malignant form of fever, accompanied with cerebral mischief, but I advised that everything should be held in readiness. I must confess I felt convinced that the disease owed its origin entirely to atmospheric causes, and that the wing was predisposed to its invasion on account of its low state of health.

I now thought it advisable strongly to urge the necessity of removing so sickly a corps to a healthy station,—a matter which had already been represented by the Brigadier-General, who had consulted me on the subject.

On 14th October, three attacks, one in No. 10 Company barrack-room, the second in the ophthalmia marquee, and a third in No. 5 Company barrack-room. I then felt compelled to recommend the removal of all the companies (except No. 3) to an elevated site in a different direction (north-east). No. 3 Company, the hospital, and married people having escaped, were allowed to remain in the station. *Progress of Events.*

On 15th, a serjeant was attacked whilst drawing tents from the arsenal. This day the companies were encamped, under the care of Assistant-Surgeon Barker. With them was sent a small but complete hospital establishment. *Four Companies encamped out.*

On the 16th October, two cases occurred, the men being attacked simultaneously at camp and in the station. These, the last cases that occurred in the wing, were intensely malignant, particularly the one at camp. They proved fatal in eight or ten hours respectively. The greatest depression of spirits was felt by almost everyone at the very extraordinary manner in which the pestilence clung to us. *Cessation of the Disease.*

The welcome order for the wing to march *en route* to Poona arrived on the 20th, and was received with the greatest satisfaction. The wisdom of the order has been proved by the result, and may be estimated by the fact that, on leaving Neemuch November 4th, the sick-list numbered seventy. On arriving at Poona, December 16th, it fell to about thirty (including fourteen invalids). The change for the better in the appearance of officers and men was very striking. *Orders arrive for the Wing to march.*

During the march, great care was bestowed in selecting the healthiest sites for camping with good water. The marches, also, were arranged to suit the debilitated state of the men. *Precautions taken on the March.*

Subjoined is a tabular statement of the number of cases, &c., from 24th May to 11th June. *Statistics of the several Outbreaks.*

	Admitted.		Died.		Recovered.	
	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.
Officers	..	..	..	..	..	..
Men	20	..	15	..	5	..
Women	4	..	4	..	..	..
Children	4	..	4	..	..	..
Total	28	..	23	..	5	..

From 11th June to 7th September, the following sporadic cases of cholera occurred :—

	Admitted.	Died.	Recovered.
Men (26th August) ..	1	..	1
Women (1st July) ..	1	1	..
Total	2	1	1

From 7th September to 31st September (2nd Outbreak).

	Admitted.		Died.		Recovered.	
	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.
Officers	..	..	..	..	..	..
Men	31	16	24	..	7	16
Women	3	1	3	..	..	1
Children	1	1	..	1	1	..
Total	35	18	27	1	8	17

From 13th to 16th October (3rd Outbreak).

	Admitted.		Died.		Recovered.	
	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.
Officers	..	..	..	..	..	1
Men	10	1	7	..	3	..
Women	..	..	..	..	..	..
Children	..	..	..	..	..	..
Total	10	1	7	..	3	1

Grand Total of Cases in the Wing.

	Admitted.		Died.		Recovered.	
	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.	Cholera.	Choleraic Diarrhœa.
Officers	..	..	..	..	..	..
Men	62	17	46	..	16	17
Women	8	1	8	..	..	1
Children	5	1	4	1	1	..
Total	75	19	58	1	17	18

No record was kept during the first outbreak of the number of cases of choleraic diarrhœa, but five would be about the number, I think.

It would have been next to impossible to have kept the total number of *diarrhœa* cases, as from morning till night men were coming in twos and threes for medicine, complaining of looseness and a sinking sensation in the epigastrium.

All the cases returned as cholera were well marked, and no cases were shown as choleraic diarrhœa without sufficient cause.

If I have erred I think it was in not showing some five or six of the cases of choleraic diarrhœa as cholera. The line of demarcation was very doubtful both to Dr. Barker and myself; and, there being a doubt, we named the disease diarrhœa, to avoid alarm as much as possible. If these cases had been shown as cholera (Dr. Barker and I looked on them as cholera aborted by early treatment), the proportion of deaths to attacks would not have been so enormously high as at present.

Remarks on the Type of the Disease.

I can give no explanation of the causes rendering the disease malignant, but *intensely malignant* it was.

That the year 1865 has been an exceptional one no person who reflects on the matter can deny. A year in which cholera spread itself far and wide over India, and extending to Aden, Egypt, the principal ports in the Mediterranean, France, parts of England, and even to the American continent.

At Neemuch the virulent nature of the poison was to be recognised by the

long period it clung to us, notwithstanding frequent and even radical moves, as well as by the short duration of the fatal cases and frightful intensity of the algide symptoms, a very large number of the cases dying collapsed. Moreover, the recoveries from the disease have been extremely unsatisfactory.

Two men died from sheer debility. Another, after a tedious reaction, was attacked with severe remittent fever, with head-symptoms, and died, after lingering for some weeks. Three were invalided for asthenia, morbus valvularum cordis, and phthisis respectively; and of the remaining number only one or two enjoy good health.

Very little can be said of the success of treatment when a case turned out to be actually cholera. When a patient came with sickness of stomach and purging, he was at once placed in bed, an emetic of mustard was given, with the general effect of bringing up large quantities of rice-water fluid. The stomach then seemed to retain stimulants, &c., better. An opiate in combination with some stimulant aromatic mixture, or an acetate of lead and opium pill, was then given, followed by a little brandy and soda-water, or port wine and arrowroot. The opiate was repeated once or twice, but not persevered in. Strong sinapisms also were applied to the epigastrium. As the algide symptoms and cramps came on, friction by native servants was diligently applied either with the hands simply, or with some strong stimulating embrocation. Blankets and hot-water bottles were also employed, but generally proved extremely distasteful to the poor sufferer, who complained of a burning heat, though actually blue and cold. To satisfy the intense thirst and relieve the vomiting, effervescing draughts and soda-water *ab libitum* were given. Arrowroot and port wine, or some very concentrated beef-tea was administered at frequent intervals, alternately with stimulant draughts.

Champagne was very freely given, mixed with soda-water. This acted well with some patients, but brandy and soda-water was found to answer better in other cases, and a few of the patients preferred port wine.

When reaction appeared likely to set in, stimulants were more cautiously administered, and finally withheld. Nourishment was still given at regular intervals. The reactionary fever was treated on general principles. I think great benefit was derived from the early application of blisters to the nape of neck and vertex, where head-symptoms threatened. Dry cupping over the loins and chlorate of potass internally were used to promote the urinary secretion.

But I can speak with greater satisfaction as to the treatment of diarrhœa which was found, in our experience, to be a premonitory symptom in a large proportion of the cases of cholera.

A large number of remedies were tried, including Dr. Collis Brown's chlorodyne (which proved a portable and valuable remedy), combinations of chloric æther, aromatic spirit of ammonia, liq. ammoniæ, oils of cajaput and aniseed, with tincture of opium, chalk powder, tinct. catechu, &c.; but by far the most effective treatment in our hands was that of the late Dr. Graves. Acetate of lead and opium by the mouth and rectum was very assiduously used, with the most gratifying results in very many unpromising cases. Towards the end it was the remedy most relied on by Dr. Barker and myself. We frequently gave, with good effect, an aromatic draught with the first couple of pills,—the stomach was thereby stimulated.

The dose by the mouth was two grains of acetate of lead and a quarter to half a grain of opium; by the rectum, five grains of acetate of lead with ten, fifteen, to thirty minims of tincture opii, and one to two ounces of thick mucilage were given. This was repeated in a few minutes if the first injection was not retained. Afterwards it was repeated every second or fourth hour, according to circumstances. It is a remedy worthy of a careful trial.

Calomel was but little used, and I cannot offer an opinion on its action.

Cholera mixture in large quantities from the stores was expended, and was found to be a most valuable astringent.

As already mentioned, no trouble was spared to detect and treat premonitory diarrhœa, and to induce the men to apply for medicines when they felt unwell. The amount of astringent stimulating medicines consumed in the barrack-rooms and tents was something amazing.

I cannot but think that our endeavours in this direction were followed by a fair measure of success.

Arrangements were made at the hospital to insure constant attendance on the sick, and Dr. Barker and myself relieved each other every four hours during the day, and took the night duty alternately. No post-mortems were made, which will be a matter of no surprise when one thinks of the very large amount of work and anxiety thrown on us both, and at a season of the year when the mere act of walking a few hundred yards in the sun was attended with feelings of the greatest lassitude and fatigue.

Our efforts were directed to prevent the occurrence of fresh cases, bearing in mind the following passage which occurs in the report of the Commission assembled to enquire into the cholera epidemic of 1861:—"It must be borne in mind that the main object during an epidemic of cholera is the prevention of fresh cases, much more than the medical treatment of those who have been attacked. That prevention is often possible, but that treatment is almost useless after virulent symptoms have appeared."

To this excellent report I looked for advice in critical times, and it rarely failed me.

Concluding Remarks.

In accordance with the instructions therein set forth, the most vigilant attention was paid to the health of the men in barracks. Cholera cases were immediately isolated; chemical disinfectants placed in the vessels that received the stools and vomit, which were forthwith buried; troops were encamped out; quarters vacated in which cholera had occurred; tents repitched under similar circumstances; cots were taken into camp during damp weather; strict attention paid to the water-supply; buildings vacated were thoroughly cleaned and purified; the hospital broken up, all slight cases being treated as out-patients; native servants, not European orderlies, were employed to attend on the sick; special doolies assigned for cholera sick; funeral parties discontinued; the men excused from needless fatigue; and, finally, all bedding and clothing used by cholera patients immediately burned. One important fact I was near omitting, viz., not one single native attached to the regiment showed the slightest sign of cholera,—a strong argument against the doctrine of contagion. The Europeans attacked were, with very few exceptions, in a weakly state of health.

Here I will conclude by saying that to Assistant-Surgeon J. E. Barker, 103rd Regiment, is due the highest praise for the zeal and ability he displayed in the performance of his duties. To his moral support I feel personally deeply indebted, and the service may well be proud of so valuable an officer.

Brigadier-General Pelly from first to last afforded us every assistance in his power; and it was owing to his active co-operation that we were able to move our camps so promptly. Everything that could be done by him was done.

RETURN of Space available at the Infantry Hospital (European) during the Hot Season.

Designation of Wards.	Available Area in each Ward in Superficial Feet.	Height of Wall.	Number of Men to be put in each Ward, at 100 Superficial Feet per Man.	Maximum Number placed therein.	Total Number of Men to be accommodated in the Hospital, at 100 Superficial Feet per Man.	Number of Men for whom Accommodation in the Hospital is required. Twelve per cent. of the Strength.	Number of Men for whom additional Accommodation is required.	Remarks as to how the additional Accommodation is proposed to be provided.
		Feet.						
Ground Floor,—No. 1 Ward ...	338	12½	5	3				
2 ...	500	12½	5	5				
3 ...	500	12½	5	5		((Present Strength of Wing 408) 48		As I consider Ward No. 7 extremely objectionable in a sanitary point of view, it being ventilated from No. 8. I am of opinion that a new Infantry hospital is required.
7 ...	1,576	26	15	14	53			
8 ...	2,212	26	22	20				
12 ...	338	12½	3	3				

The above Wards are on the ground-floor. The wards on the upper floor are not available from February to June on account of the heat.

RETURN of Space available in the Infantry Hospital (European) during Rains and Cold Season.

Designation of Wards.	Available Area in each Ward, in Superficial Feet.	Height of Wall.	Number of Men to be put in each Ward, at 100 Superficial Feet per Man.	Maximum Number placed therein.	Total Number of Men to be accommodated in the Hospital, at 100 Superficial Feet per Man.	Number of Men for whom Accommodation in the Hospital is required. Twelve per cent. of the Strength.	Number of Men for whom additional Accommodation is is required.	Remarks as to how additional Accommodation is proposed to be provided.
		Feet.						
Ground Floor,—No. 1 Ward ...	338	12½	3	3				
2 ...	500	12½	5	5				
3 ...	500	12½	5	5				During the rains and cold season there is ample accommodation without using the objectionable Ward No. 7, Ground Floor
7 ...	1,576	26	15	10				
8 ...	2,212	26	22	20				
12 ...	338	12½	3	3	79	48		
Second Floor,—No. 1 ...	500	14½	5	4				
2 ...	500	14½	5	4				
3 ...	338	14½	3	2				
6 ...	338	14½	3	2				
8 ...	1,037	14½	10	10				

REPORT ON HYGIENE FOR THE YEAR 1865.

By E. A. Parkes, M.D., F.R.S., Professor of Hygiene in the Army Medical School.

This Report is intended to give a selection from the chief works and essays published during the year, which, in a hygienic point of view, are likely to be interesting to Army Medical Officers.

Owing to the length of some of the topics this year various notices have been omitted which, when necessary, will be included in next year's report.

The subjects treated of are:—

1. Food.
2. Air, purification of, by disinfection.
3. Removal of sewage.
4. Spread of the specific diseases and precautions.

Food.

Meat from Diseased Animals.—The prevalence of cattle plague in England has afforded some opportunity for determining whether or not the meat and milk are injurious to men. The evidence is entirely negative; no grounds have been given for thinking that the meat at any period of the disease is injurious, as long as decomposition has not commenced, and the milk of animals recovering from cattle plague has been given to children without bad results. It is, of course, open to question whether the cattle plague meat may not produce some bad effects which are not detected, and certainly there is great difficulty in tracing the meat in the market and of being sure that no injury results. But then, the immense quantity of cattle plague meat which has been used in the last twelve months, and the entire absence of any suspicion of injury from it, makes it unlikely that harm has been done but been overlooked. The previous evidence is also entirely negative. It is possible, of course, that the cooking may destroy any deleterious condition of the meat, or, as men are not susceptible to the cattle plague poison, the meat, even if it contains what would be a poison to cattle, may be to them not only innocuous but as nutritious as usual.

Trichina.—In last year's Report (Vol. 5, p. 436) reference was made to a case in which the trichinæ were living and capable of producing the disease eight years after entering the human muscles. Dr. Klopsch has now related a case* in which an attack of trichinosis occurred in 1842, and twenty-four years afterwards, on the death of the patient, *living* encapsuled trichinæ were found. From the time of the attack in 1842 till her death the patient, a woman, remained perfectly well, so that a later introduction of the trichinæ was not possible.

Rainey's Corpuscles.—The microscopical examination of the muscular fibre in animals dead from cattle plague has brought to light the fact of the very frequent existence of the peculiar bodies, known in this country as Rainey's corpuscles, in both beef and mutton. At first it was conjectured by some that these bodies had some causal connection with the cattle plague, but this was soon found to be a mistake, as they exist very frequently in perfectly healthy cattle. They are not known at present to be injurious either at once or subsequently; if they are entozoa they undergo apparently no development in the alimentary canal of men. They are of importance, however, as they might be confounded by a careless enquirer with trichinæ or cysticerci.

Dr. Beale has very carefully examined them, and the following description is from his Report to the Cattle Plague Commissioners.

"These bodies are exceedingly distinct; they vary much in size, but invariably exhibit the same general characters. There is little difficulty in finding them if only very small pieces of muscular tissue be subjected to examination, but being very transparent they are easily hidden from view if surrounded by several elementary muscular fibres, and thus they may escape detection. They vary in number, and I should think that in some cases I have seen them as numerous as one to, at the most, twenty muscular fibres, while in others perhaps they may not be found in greater numbers than in the proportion

* Virchow's Archiv., Band. 35, p. 609 (1866).

of one to a hundred muscular fibres. The smallest are oval, but as they grow they become spindle-shaped, and usually one end is pointed, while the opposite extremity is more or less rounded. In some there are slight projections from different parts of the surface, as if there were tendency to the formation of segments or lateral pores; but in the larger ones the outline appears perfectly uniform. In all there is a distinct investing membrane of a peculiar structure, varying in thickness in bodies of different sizes, the outer surface of which is in contact with the sarcous tissue, or with the sarcolemma, save in the few instances in which the bodies are free

* * * * * *

"Not the least interesting point in connection with these curious bodies is the investing membrane.

"The tissue is very transparent, and varying in thickness in different parts. It appears to exhibit delicate transverse markings, but upon careful examination it is found that these are caused by the linear arrangement of minute hair-like fibres. These processes of the investing membrane were described by Mr. Rainey in his paper in the Phil. Trans. for 1857. He says they increase in size and distinctiveness as the animal grows larger 'They have not the sharp and well-defined outline of true cilia, nor are they pointed like setæ, or curled like cirri.' In a specimen in my possession, however, the bodies in question are certainly pointed, and the whole appearance, under a power of 1,000 diameter, is such as would result if the investment consisted of very delicate transparent conical hairs, terminating outwards in the pointed processes. After lying in water for some time the projecting filaments exhibited the usual characteristics of cilia and would no doubt have been termed cilia by any naturalist. The structure of this membrane is so beautiful and delicate that it might be employed as a test object for ascertaining the defining power of object glasses.

* * * * * *

"The contents of these spindle-shaped bags, cysts, or investments, without doubt form the most important part of the mass and are well worthy of the most attentive consideration. When examined by a low power, the matter occupying the cavity appears granular, and there are distinct indications of the mass being subdivided into smaller portions, the divisions being most distinct transversely. I do not think there are distinct septa, but the appearance is such as would result if each of a number of masses of germinal matter in the interior of a cavity with extensible walls were to divide and subdivide into numerous masses, which were capable of growth and multiplication.

"The entire contents of every one of these bodies I have seen exhibit the same characters. There is no indication of alimentary canal, ovary, secreting gland, or other organ. It is therefore only necessary to call attention to the small individual particles of an aggregation of which each of the peculiar bodies in question entirely and invariably consist.

"When perfectly mature the body is curved, one extremity being rounded, while the other is almost sharp. These particles are for the most part of an oval form, or spindle-shaped. They are flattened, and apparently consist of a transparent material, which exhibits here and there spots differing in refraction from the rest of the mass. These are irregularly disseminated throughout the mass, and give to it a granular appearance when it is examined by low powers, but under the influence of high magnifying powers the appearance is such as to render it doubtful, if, at least in all cases, these are actual granules distinct from the general mass."—*Report to Cattle Plague Commissioners, Appendix.*

Fungi in Milk.—That fungi and vibriones both form rapidly in milk when exposed to the air, is well known. Dr. Hessling has, however, lately described and figured them very carefully.*

The first appearance of the spores of fungi in fresh milk exposed to the air occurs from 15 to 24 hours in warm weather, or two or three days in cold, after the milk is drawn. They are seen long before any increased acidity is perceptible to the taste. They rapidly increase, and some form threads. The name of the fungus is not certain; it has a great resemblance to the fungus of the egg, which belongs to the "Ascophora." The spores have a length of 0·002 to 0·01 millimetres, and a breadth of 0·00045 to 0·0025; have a feebly contured, fine granular outline, and contain sometimes air bubbles, but frequently

* Virchow's Archiv., Band 35, p. 561.

decided large nuclei. They lie in the lower strata of the fluid, and this helps to distinguish them from the fat globules of the butter. The threads growing from the spores are variable in thickness, often filled with granular curtains, and often bear thick branches with pointed ends. Fructification is sometimes seen.

In cream and in butter these fungi are seen in enormous quantity, but vibriones are uncommon.

This investigation is especially of importance as connected with diseases of children. It is possible that the digestive attacks of children, the occurrence of apthæ, &c., may be connected with an excessive growth of these fungi, which possibly lead to further rapid changes in the milk in the stomach, so that an unusual quantity of lactic and butyric acids may be produced. The question is well worthy of investigation.

Air.—Purification of, by Disinfection.

Owing chiefly to the spread of cattle plague in England, the subject of disinfection has attracted much attention; and considerable interest has been excited by the use which has been made of the tar acids (carbolic and cresylic) as preventatives of cattle plague. Reports on disinfection by Dr. Angus Smith and Mr. Crooks, published in the Third Report of the Cattle Plague Commissioners, contain much information on the subject generally, as well as special experiments on the tar acids, and, in addition, some French writers on carbolic acid* have made considerable medical as well as sanitary application of these acids. As carbolic and cresylic acids will be very largely used in medicine, it will be useful to give some account of these reports and works. It may be premised, however, that there seems a little danger that the term "*disinfectant*" may be vaguely used, and it seems most desirable to have some well understood definition. Among medical men, I conceive that it is employed in a precise and restricted sense, as expressing an agent which arrests the power of a contagious disease to extend itself, or to put it in the usual language, "disinfectants destroy the viri of the infectious or specific diseases."

* But the word is sometimes used in a different sense, to express any substance which frees the atmosphere from foreign matter, whether gaseous or molecular. Mr. Angus Smith thus states the case:—

"I hope I do not go too far when I suppose a class of diseases caused, 1st, by gases, not putrid but injurious, easily diffused into the air, and more or less soluble in water; 2nd, by vapours, heavy and capable of falling, especially in cold air, capable also of being taken up in the moisture of fogs; 3rd, of putrid or decomposing substances or ferments; and 4th, of organized bodies or germs in various stages. Disinfection is the destruction of one or all."—*Report to Cattle Plague Commissioners.*

And Mr. Crookes writes:—

"Disinfection in the widest sense of the term, means the destruction of all substances either injurious to health or offensive to the sense of smell, arising from putrefying organic matter, or emanating from diseased animals.

"When the products of the putrefaction of animal and vegetable matter are examined, they are found to consist of some or all of the following gases and vapours:—

Sulphuretted hydroge..,
Phosphuretted hydrogen,
Ammonia,
Phosphorus and nitrogen, bases of complex constitution,
Acetic, butyric, valerianic, &c., acids,
Carburetted hydrogen,
Hydrogen,
Carbonic oxide,
Carbonic acid,
Nitrogen,
The special virus of contagion, and
Various organized animal and vegetable products of little or no activity.

e l'acide phénique, par Jules Lemaire, Paris, 1865. Nouvelles applications de l'acide phénique, par G. Déclat, Paris, 1865.

In its general sense disinfection means the rendering inodorous and innocuous the whole of these substances.

"In a more restricted sense the term disinfectants is used to express those agents which destroy organic or offensive matter by oxidation or analogous action; whilst under the term antiseptics are classed those agents which prevent chemical change by destroying the tendency to putrefy. They are termed by Dr. Angus Smith colytics, from κωλυω, I arrest.

"Disinfectants are by far the best known and most popular, inasmuch as they appeal directly to popular prejudice by destroying the foul odours which are the usual accompaniments of infection, whilst antiseptics have little or no action on these gases. I hope to succeed in showing that this mode of estimating their relative value is one which does great injustice to the latter class." —*Report of the Cattle Plague Commissioners.*

A distinction is here drawn between disinfectants and antiseptics, which would hardly be admitted in medical writings. Whether the virus of small-pox, or similar diseases be destroyed by chlorine or ozone which oxidize, or by carbolic acid which does not do so, is a matter which does not affect the definition. The point is, that the virus is destroyed. The result, not the process, must fix the definition.

A substance which destroys sulphuretted hydrogen may properly be called a deodorizer, or an air-purifier, but we conceive ought not to be called a disinfectant

No doubt many substances are both disinfectants and air purifiers, or deodorizers from gases or other matters besides animal poisons, but in abstract the two actions are not identical.

The mode of action of disinfectants on the viri of the specific diseases has been much advanced by the labours of Dr. Smith and Mr. Crookes. The latter gentleman has shown conclusively that the attempted division of disinfectants into oxidizers and arresters of oxidation must be given up. Carbolic acid, for example, does not oxidize, but it also does not arrest oxidation; it is so far indifferent; it acts in a remarkable manner by restraining the tendency to putrefaction, while it does not check other actions which have been often supposed to be closely connected with putrefaction.

Mr. Crookes' experiments are so interesting that it will be desirable to give them in full.

"*The Tar Acids* (*Carbolic and Cresylic Acids*).—These two bodies are so commonly known under the name of acids that I shall continue so to designate them, although by chemists they are more generally classed with the alcohols. They have great similarity, and only within the last few months have they been met with separately in commerce, having hitherto been both called carbolic acid. Creosote (κρέας σώζειν, to preserve flesh) prepared from coal tar, one of the most powerful antiseptics known, was thought to be impure carbolic acid until 1854, when Professor Williamson and Mr. Fairlie, in an investigation of it, discovered that it was a mixture of carbolic and cresylic acids. It was then taken for granted that Reichenbach's creosote, from wood tar, had a similar composition, until Hlasiwetz, in 1858, showed that this creosote was a different body from carbolic or cresylic acids. Finally Dr. Hugo Müller, in 1864, discovered that true creosote, and its analogue guaiacol, belonged to a different class of bodies, and consisted of methy-oxy-phenic and methyl-oxy-cresylic acids. No experiments on the large scale have yet been tried with true creosote, as I have only been aware within the last few weeks that this compound could be obtained in quantity.

"Pure carbolic acid is a white crystalline solid, melting at 34° C. and distilling at 180° C.; a trace of water or oily impurity renders it liquid, and for disinfecting purposes it is always supplied in this form, to avoid the extra expense and trouble needed for the separation of the last traces of impurity; cresylic acid is liquid, it boils at 203° C., and closely resembles carbolic acid in odour and other properties. Before the commencement of these inquiries it was thought to be of little or no value as a disinfectant, but Dr. Angus Smith has lately shown that it rivals, if it does not surpass, carbolic acid in antiseptic properties. For the present purpose of cattle plague disinfection it is immaterial which acid is used, and to avoid unnecessary repetition I shall use the term carbolic acid to express either acid, or the commercial mixture of the two acids.

"From time immemorial carbolic acid, creosote, or bodies containing them, have been used as antiseptics. Passages in Pliny, read by the light of chemical science, show that the Egyptians used for embalming their mummies a compound made from pitch, which must have contained large quantities of creosote. Carbolic acid is the active agent in tar, which either in its ordinary state, or burnt as a fumigator has always held high rank amongst disinfectants. Pitch and tar were the most popular medicines in use against the cattle plague when it visited this island in the last century; the animals being preserved against contagion by having their noses and jaws rubbed with tar, whilst the cow-houses were disinfected by burning pitch and tar in them (in which process a certain quantity of the vapours of carbolic acid would escape combustion). The almost universal custom of burning gum resins and odoriferous woods in connection with religious ceremonies may have originally arisen from the disinfecting powers of the creosote in the smoke. The well-known efficacy of smoke in preserving meat is entirely due to the presence in it of this agent.

"Pitch oil, oil of tar, and similar products owe their value entirely to carbolic acid. This body may in fact be called the active principle of tar, just as quinine is the active principle of bark, or morphia of opium, and it has the great advantage of being easily prepared in any country where coal or wood can be obtained.

"Sulphurous acid probably owes some of its antiseptic value to its affinity for oxygen, whereby the oxidation of the matter under treatment is retarded. It has been suggested that the value of carbolic acid is due to a similar property, and that it acts merely by preventing oxidation. It being important to a thorough understanding of its action that this point should be settled, the following experiments were made:

"1. Lumps of metallic sodium were cut with a sharp knife: the progress of the oxidation could be readily followed by the change of colour of the surface. The experiment was tried several times in an atmosphere strongly charged with the vapour of pure carbolic acid and of cresylic acid; comparative experiments being made at the same time in pure air. No difference in the rate or amount of oxidation could be detected.

"2. A colourless solution of subchloride of copper in ammonia was prepared and divided into two parts; one being mixed with a little carbolic acid. On pouring them through the air into flat white dishes, no difference in the progress of oxidation could be detected.

"3. A mixture of pyrogallic acid and solution of potash was shaken up in a large stoppered bottle. It was then opened under water, and the amount of absorption of the atmospheric oxygen noted. The same experiment was repeated after the addition of carbolic acid to the potash solution. The same quantities were used and the agitation was continued for the same time. On again opening the bottle under water the absorption was found to be the same as before.

"4. The last experiment was repeated, substituting crystals of sulphate of iron for pyrogallic acid. The result showed equally that the presence of carbolic acid exerted no retarding influence on the oxidation.

"5. Iron filings were shaken up in water with the same result.

"6. A 'philosophical lamp' was made by arranging a platinum spiral over the wick of a spirit lamp, containing alcohol mixed with a little ether; on lighting, and then blowing it out, the platinum continued to glow brightly. Pieces of solid carbolic acid were then carefully placed in the cup of the brass wick holder, surrounding, but not in contact with, the wick. The heat soon melted the acid and raised its vapour round the platinum spiral, but without occasioning any alteration in the brightness of its glow.

"7. Lead pyrophorus was poured into two long and narrow jars of air, one of which had its interior moistened with liquid carbolic acid. Not the slightest appreciable difference could be detected between the rapidity of oxidation in the two jars.

"8. Paper moistened with sulphate of manganese solution, and dried, was dipped into caustic ammonia, both with and without carbolic acid. No difference whatever could be detected in the rate of its darkening.

"These experiments prove conclusively that the tar acids have no special power of retarding oxidation.

"Other experiments were then instituted in the endeavour to understand more clearly the mode of action of carbolic acid.

"9. Some meat was hung up in the air till the odour of putrefaction was strong. It was then divided into two pieces; one was soaked for half an hour in chloride of lime solution, and was then washed and hung up again; the offensive smell had entirely gone. The other piece of meat was soaked in a solution of carbolic acid containing one per cent. of the acid; it was then dried and hung up. The surface of the meat was whitened, its offensive odour was not removed, though it was masked by the carbolic acid. In two days' time the bad odour had quite gone, and was replaced by a pure but faint smell of carbolic acid. In a few weeks' time the pieces of meat were examined again. The one which had been deodorized with chloride of lime now smelt as offensively as it did at first, whilst the piece treated with carbolic acid had simply dried up, and had no offensive odour whatever. It was then hung up for another month and examined; no change had taken place.

"10. A piece of fresh meat was soaked in a one per cent. aqueous solution of carbolic acid for one hour; it was then wrapped in paper and hung up in a sitting-room in which there was a fire almost daily; at the end of ten weeks it was examined. It had dried up to about one-fourth of its original size, but looked and smelt perfectly good and fresh, a very faint odour of carbolic acid being all that was perceptible. It was soaked for twenty-four hours in water, and then stewed with appropriate condiments and eaten; it was perfectly sweet, and scarcely distinguishable from fresh meat, except by possessing a very faint flavour of carbolic acid, not strong enough to be unpleasant.

"11. Animal membranes in the forms of gut, skin, and bladder, were perfectly preserved if immersed direct in aqueous solution containing one per cent of carbolic acid; but if previously moistened with water, and then immersed in dilute carbolic acid the preservation of the skin was not so complete.

"12. Animal size and glue, mixed, in the form of solution, with small quantities of carbolic acid, were perfectly preserved from change even in hot weather.

"These are important experiments. They point out in a striking manner the difference between mere deodorizers and antiseptics. Hitherto attention has been almost entirely confined to the deodorization of gases arising from putrescence. The effect has been combated, whilst the removal of the cause has received scarcely any attention. Chloride of lime, one of the strongest of the class of deodorizers, acts, as has been shown, only on the gases of existing putrefaction, but it has no influence over the future. Carbolic acid, on the other hand, has scarcely any action on fœtid gases; but it attacks the cause which produces them, and, at the same time, puts the organic matter in such a state that it never re-acquires its tendency to putrefy.

"It became now a matter of considerable interest to ascertain in what way carbolic acid acted in arresting decomposition, and the following experiments were made with the object of clearing up this point:

"13. Albumen was mixed with four times its bulk of water, and a one per cent. solution of pure carbolic acid was added to it. No change took place for the first few minutes, but after a little time a white cloudiness was formed, which gradually collected together into a coagulum. On separating this, and exposing it freely to the air, it entirely resisted putrefactive decomposition. The solution strained from the coagulum still contained carbolic acid and uncoagulated albumen.

"14. The same experiment was repeated with pure cresylic acid. This acid has still less affinity for albumen, the mixed solutions remaining clear for nearly half an hour.

"It is evident, therefore, that the tar acids do not owe their special action to their coagulating powers on albumen, for the last two experiments show, contrary to the generally received opinion, that their affinity for this body is but slight.

"15. A few drops of carbolic acid, added to half a pint of sugar syrup and yeast in full action, immediately put a stop to the fermentation.

"16. Fresh brewer's yeast was washed with a solution of one per cent. of carbolic acid, and then with water. Its power of inducing fermentation in a solution of sugar was entirely destroyed, although no perceptible change in the appearance of the yeast cells could be detected under the microscope. This experiment was repeated several times, and always with the same result, although when the yeast was simply washed in water it readily induced fermentation.

"The odour of carbolic acid adhered most pertinaciously to the yeast, and by no ordinary amount of washing and exposure to the air could it be removed.

"17. Strychnine was added to a mixture of yeast and sugar solution in full fermentation. No visible effect was produced, the evolution of carbonic acid continuing as brisk as before.

"The above experiments, some of which were performed by my friend Mr. Spiller, prove conclusively that carbolic acid has a special action on the fermentation induced by organized matter; it not only arrests it instantly when in progress, but it prevents the development of future fermentation.

"The action of the tar acids was now examined on certain chemical bodies which are supposed to act by fermentation, in order to see if they were influenced in the same manner.

"18. A solution of diastase (infusion of malt) was mixed with thick starch paste, and a one per cent. solution of carbolic acid. On gently heating for a short time, the starch was converted into dextrine, as completely as if no carbolic acid had been present.

"19. Amygdalin was mixed with synaptase (emulsion of sweet almonds) in the presence of carbolic acid. The formation of the essential oil took place with apparently the same readiness as if carbolic acid had been absent.*

"The foregoing results show that carbolic acid has no action on purely chemical ferments. These consist of definite nitrogenous compounds acting simply by chemical affinity, and therefore ought not to be classed with true ferments, which are living bodies. It, therefore, appears that carbolic acid acts by attacking vitality in some mysterious way, and where an effect is merely due to so-called catalytic force, it exerts no interfering action.

"The action of carbolic acid on vitality was then tested in other ways:—

"20. Cheese mites were immersed in water, where they lived for several hours. A few drops of a solution of carbolic acid containing one per cent. added to the liquid killed them instantly.

"21. An aqueous solution of carbolic acid was added to water in which a small fish was swimming. It proved fatal in a few minutes.

"22. A very minute quantity of a weak solution of carbolic acid was added, under the microscope, to water containing various infusoria, such as bacteria, vibrios, spirilla, amœbæa, monads, euglenæa, paramecia, rotifera, and vorticellæ. The acid proved instantly fatal, arresting the movements of the animacules at once.

"These animacules are the almost invariable accompaniments of putrefactive fermentation. The above experiment has been tried with putrid blood, sour paste, and decayed cheese, and in every instance the destruction of vitality and the arrest of putrefaction have been simultaneous.

"23. Caterpillars, beetles, crickets, fleas, moths, and gnats were covered with a glass, the inside of which was smeared with carbolic acid. The vapour proved quickly fatal. It allays the pain caused by the stings of bees, wasps, hornets, and gnats, if applied pure, or in strong solution, to the wounded part.

"I find it recorded by Dr. Lemaire, and other observers, that carbolic acid vapour will also kill flies, ants and their eggs, lice, bugs, ticks, acari, mosquitoes, aphides, butterflies, earwigs, wood-lice, cockchafers, centipedes, and other insects of this size; its vapour, however, does not appear to be strong enough to act injuriously on animals larger than mice. When such animals are killed with it their bodies dry up in the air, and resist putrefaction for some time.

* These last two experiments are confirmatory of a statement in Dr. Lemaire's work, "Sur l'Acide phénique,"

"From the intense aversion shown by all insects to the odour of carbolic acid it is probable that the plentiful use of this agent would effectually preserve cattle from those terrible scourges met with in certain parts of Africa, the zimb and tsetse fly. The effects following the bite of the latter have been described to me as being almost identical with the symptoms of cattle plague.

"M. Lucien Biard, in speaking of the invasions of the large ants of Mexico, says that when one of their battalions threatens his house he sprinkles a little carbolic acid in front of it. The army immediately make a detour to avoid the obstacle.

"When an animal is killed by the injection of a saturated aqueous solution of carbolic acid into its veins, circulation is instantly arrested, the blood is not coagulated, and no alteration, either in the shape or the appearance of the globules is detected under the microscope. The only apparent change consists in the immobility of the globules.

"In the "Annales de Chimie et de Physique" for October last, there is a letter from M. Béchamp to M. Dumas, in which it is said that creosote appears to be the agent which most strongly opposes the development of organic ferments, but that it does not interfere with the living ferments or animacules when they are once developed. This assertion is in direct opposition to all my experiments, about the accuracy of which I have no doubt whatever, having submitted them to repeated tests. The powerful action which carbolic acid exerts on the phenomena of life is the most remarkable property which it possesses. It may be looked upon as the test proper for distinguishing vital from purely physical phenomena, and in most cases its action is characterised by the certainty and definiteness of a chemical re-agent. In the presence of carbolic acid the development of embryotic life is impossible, and before its powerful influence all minute forms of animal life must inevitably perish.

"It may be considered as definitively proved that the vapour of carbolic acid, in the atmosphere, exerts a special selective power on all minute organisms possessing life. If the contagious matter of cattle plague is possessed of organic vitality, as must be now admitted, it will be destroyed, beyond the possibility of revival, when brought into contact with the vapour. French experimentalists have repeatedly tested the influence of carbolic acid on vaccine lymph. They have employed lymph, both pure and mixed with a trace of carbolic acid. The vaccination with pure lymph was followed by the usual results, but in no single instance was any effect produced by the lymph containing carbolic acid.

"The following experiments tend to show a similarity between the action of vaccine virus and that of the cattle plague:—

"24. The air from a close, highly infected shed containing animals in the last stage of the disease, was drawn through glass tubes containing tufts of cotton wool, in the expectation that some of the virus-cells, supposed to be floating about in the atmosphere, would be arrested by the wool.

"The suction was continued for ten minutes. One piece of the infected wool was then exposed for half an hour to the vapour of carbolic acid. Two apparently healthy calves were selected, and an incision being made beneath the skin, these pieces of wool were respectively inserted in each. The animal thus innoculated with the infected wool, which had been exposed to carbolic acid, remained perfectly well, but the other animal took the disease and died in a few days.

"I place this upon record, although I do not attach much importance to it, as the experiment was made at a farm where the plague was raging; and it is quite possible that the calf which died did not take the disease from the wool. Unfortunately, time would not permit me to verify this experiment so as to place its results beyond doubt. It is likewise desirable to innoculate with the virus itself, collected from the eyes, &c., of diseased animals, mixed with different quantities of carbolic acid. There can be little doubt that the issue would prove satisfactory.

"I first employed carbolic acid on a large scale early in December las Considerable experience suggested to me the best way of proceeding, and I consider that the results have proved that my views were correct. A detailed account of the various experiments is given in the next parts.

"I had two objects in view: firstly, to apply the energetic disinfecting powers of sulphurous acid for the purpose of purifying the cattle sheds two or three times a week; and secondly, to trust to carbolic acid as a permanent means of protecting the animals from extraneous infection. Sulphur fumigation and carbolic acid agree very well together, and somewhat assist each other's action; whereas oxidizing disinfectants, used either with carbolic acid or sulphurous acid, are inoperative; the energies which should be directed to the destruction of infection being exhausted in neutralizing each other. When dealing with such an overwhelming amount of putrefying and putrescible organic matter as is met with in a farm-yard it is of paramount importance to economise as much as possible the disinfectant. I have already shown that chlorine and ozone are very wasteful agents. As it is our chief aim to destroy the activity of cattle plague virus (the destruction of ordinary farm-yard odours being of secondary importance), even sulphurous acid is open to objection on the score of waste; but carbolic acid goes direct to the root of the evil, and acts solely where it is most required, without touching the innocuous dunghill stenches. Owing to the power possessed by carbolic acid of arresting and preventing decomposition, it checks the evolution of these offensive odours, and, by retaining the nitrogenous compounds in the manure, it greatly increases its value. At the same time it stops the development in the manure of minute animal organisms, and it has been observed that flies never congregate about dunghills where carbolic acid has been habitually used, whilst the liquid manure which oozes from them is without smell. In stables and cowsheds this property is of very great importance, both as regards the comfort and health of the animals, especially during the hot summer months.

"Another advantage of carbolic acid over almost all other *disinfecting* agents consists in the fact that its vapour is never injurious or unpleasant to cattle. *Indeed they seem to like it; they lick the woodwork of their stalls after it has been sprinkled with the undiluted acid, and will readily drink* water in which the acid has been *dissolved. If applied to their mouths in its* undiluted state I am told that it will produce temporary blistering; but such blisters are entirely free from danger, and heal very rapidly. From its action on the human skin, if carelessly used, I have no doubt that inconvenience to the cattle might arise; but although carbolic acid has been used freely by me, and by many farm servants under my directions, in the treatment of several hundred animals, I have not had a single instance of this action brought under my personal notice.

"If undiluted carbolic acid is allowed to remain on the hands it will act as a mild caustic. This inconvenience is, however, very slight, and may be avoided with ordinary care. I have had my hands repeatedly covered with carbolic acid during the last four months without experiencing any painful effect. Ample warning of the approach of blistering is given by a preliminary smarting, and if this is attended to, and the acid rubbed or washed off, no further annoyance is felt. Sweet oil rubbed over will remove the least traces of the acid.

"Finding that medical and scientific writers were unanimous in the opinion that small internal doses of carbolic acid were attended with no injurious effect, I have recommended the addition of small quantities both to the food and water given to the whole of the stock, sick or healthy, on the farm. This has a two-fold action. The water given to cattle is seldom very pure, and carbolic acid will neutralize any virus of infection which may happen to have found its way into it. Moreover, after drinking aqueous carbolic acid the breath smells of it for some hours. Now it is very probable that the germs of infection enter the animal system through the mouth, and by thus loading the breath with the antidote it is reasonable to suppose that these germs would be destroyed before they had an opportunity of doing harm. The vapour of the acid, when diffused through the air, will kill large insects; it is reasonable, therefore, to suppose that it will much more readily destroy microscopic germs when brought into contact with its vapour during respiration. Besides, it is not unlikely that after the system has become habituated to repeated doses of carbolic acid it will acquire additional power of resisting the first attack of disease.

"Since this investigation was undertaken I have made a collection of cases,

illustrating the good effect of carbolic acid, in arresting the spread of the cattle plague, in various parts of England and the Continent. I will not, however, enter into particulars, but confine myself to those cases which have come under my own immediate knowledge.* I have not yet met with a single instance in which the plague has spread on a farm where this acid had been freely used.

"*On the Adulterations of Carbolic Acid, and their Detection.*—The official recommendations have naturally brought into the market many substitutions for carbolic acid, in which the valuable agent is diluted with cheap inert bodies, whilst the price charged, in some cases, is higher than that of the genuine article. Specimens of two such substitutions, called cresyline and carboline, were forwarded to the Royal Cattle Plague Commission for approval, 'as being more certain disinfectants than most of the carbolic acids now being sold to the public, many of which contain but a very small per centage of that acid.' It was stated that the preparation contained over 60 per cent. of carbolic acid, and were miscible with water. As it was possible from these and other reputed advantages that the preparation might be of considerable value, they were forwarded to me for examination. Cresyline consists of alkaline water, and tar oils boiling above 370° C., therefore containing little or no carbolic or cresylic acids. Carboline is a dilute solution of caustic soda, containing 4·1 per cent. of carbolic acid. The price of these preparations is higher than that ordinarily charged for good commercial carbolic and cresylic acids.

"Other creosote samples from different makers were found to contain respectively 4·5, 2·6, 5·9, and 4·2 per cent. of carbolic acid, the rest being tar oils. In other instances, articles have been sold as commercially pure carbolic acid, which were found to contain from 30 to 50 per cent. Frequently a very fœtid sulphur compound is allowed to remain. This should be avoided, as although the antiseptic powers of the liquid are great, the offensive odour which it diffuses round the neighbourhood is excessively nauseous.

"*It is by no means difficult to detect the adulterations referred to above.* Commercial carbolic acid is soluble in from 20 to 70 parts of water, or in twice its bulk of a solution of caustic soda, while oil of tar is nearly insoluble; but if the amount of carbolic acid be increased some remains undissolved.

"To apply the tests:—1. Put a teaspoonful of the carbolic acid in a bottle, pour on it half a pint of warm water and shake the bottle at intervals for half an hour, when the amount of oily residue will show the impurity. Or, dissolve one part of caustic soda in ten parts of warm water, and shake it up with five parts of the carbolic acid. As before, the residue will indicate the amount of impurity.

"These tests will show whether tar oils have been used as adulterants; but to ascertain whether the liquid consists of a mere solution of carbolic acid in water or alkali, or whether it contains sulpho-carbolic or sulpho-cresylic acids another test must be used, based upon the solubility of these, and the insolubility of carbolic acid, in a small quantity of water. In this case proceed as follows:—2. Put a wineglassfull of the liquid to be tested in a bottle, and pour on it *half* a pint of warm water. If the greater part dissolves it is an adulterated article. Test the liquid in the bottle with litmus paper; if strongly acid it will show the probable presence of sulpho-acids, whilst if alkaline it will show that caustic soda has been probably used as a solvent.

"These tests are not given as having any pretensions to scientific accuracy, but as affording persons who are desirous of using carbolic acid, and are willing to pay a fair price, a rough and ready means of seeing if they are being imposed upon.

"If greater accuracy in the tests are required, recourse should also be had to distillation with a thermometer,—carbolic acid boils at 184° C., cresylic at 203° C., whilst xylic acid, which may possibly be present, and has great antiseptic value, boils at 220° C., Reichenbach's pure creosote boils at 219° C."—*Third Report of the Cattle Plague Commission.*

* It may, however, be of interest to state that carbolic acid was the principal substance used in the Jardin d'Acclimatation, in the Bois de Boulogne, to prevent the spread of the disease amongst the animals in that establishment. According to the Journal of the Society of Arts for April 13th, 1866, more than twenty pounds of this acid were used daily, in washing the walls and mangers, and in sprinkling the floors of the stables and enclosures, and it is to its constant use that the arrest of the malady is generally attributed.

Subsequent experiments have, I understand, confirmed Mr. Crooke's opinion of the great effect of carbolic acid when rightly used in arresting cattle plague. Sound animals have been kept within eight feet of sick beasts without taking the plague, when the air was kept constantly charged with carbolic acid. But if this be so, it is evident that its powers are likely to be still greater in the cases of typhoid and yellow fevers, cholera, and putrid dysentery, in all of which cases an amount of ordinary putrefaction seems to be combined with the peculiar unknown chemical conditions which are special to the viri themselves.

Carbolic acid also prevents the development of malaria, but it is impossible, of course, to use it on such a scale as to produce much action in this direction. The observations of Dr. Swaine on carbolic acid have indicated one point of great practical importance. Fatty matters combine with the acid, and destroy its antiseptic action on adjacent decomposing substances. A large quantity of carbolic acid is necessary in these cases. The acid is also very volatile, and its action is therefore often transient; in cold weather it will keep urine good for several days; in hot weather it rapidly volatilizes, and the urine then decomposes.

The action of the other chief disinfectants, chlorine, iodine, sulphurous acid, nitrous acid, ozone, &c., has not received any further elucidation. That some of them are active oxidizers, like chlorine and nitrous acid, iodine, and ozone; that others like sulphurous acid, probably abstract oxygen, must be admitted; but whether the undoubted power these substances have of destroying the viri of specific diseases is connected with this chemical action is yet uncertain. All these substances, except perhaps ozone, check more or less completely the so-called fermentative processes which produce putrefaction, and their power on animal poisons may be owing to this. If so, their oxidizing or deoxidizing power may be of minor importance, and their disinfecting action may be identical with that of carbolic acid. If it should turn out that the views and experiments of Schwann, Schroeder, and Pasteur are confirmed, and there seems a great probability of this, and if putrefaction is a fermentation then the whole class of disinfectants (using this term in its true and limited sense) may act simply as antiseptic or anti-fermentative agents.

Removal of Sewage

The most important essay which has been published since the last Report is one "On the Composition, Value, and Utilization of Town Sewage," by Messrs. Lawes and Gilbert. As the experiments and opinions of the authors are well known, there is nothing very new; but the whole subject is brought carefully under review, and the results of the numerous and important experiments of the authors are given in a concise form. As might be expected from the known opinions of the writers, the removal of sewage by water, and its application to land, is strongly advocated. Some of the dry methods are considered, but chiefly from an agricultural point of view; and it must be admitted that the writers have not sufficiently discussed the question, "What system is the best when a proper supply of water cannot be obtained?" The issue they appear to have placed before them is the respective merits of the water and the dry system, when both are practicable. They find no difficulty in coming to a decision on this point, and end their paper with the following practical conclusions:—

"It is only by a liberal use of water that the refuse matters of large populations can be removed from their dwellings without nuisance and injury to health.

"2. That the discharge of town sewage into rivers renders them unfit as a water supply to other towns, is destructive of their fish, causes deposits which injure their channels, gives rise to emanations which are injurious to health, is a great waste of manurial matter, and should not be permitted.

"3. That the proper mode of both utilizing and purifying sewage is to apply it to land.

"4. That considering the great dilution of town sewage, its constant daily supply at all seasons, its greater amount in wet weather when the ground can least bear or least requires more water, and the cost of distribution, it is best fitted for application to grass, which alone can receive it the year round. It

may, however, be occasionally applied with advantage to other crops within easy reach of the line or area laid down for the continuous application to grass.

"5. That having regard both to urban and rural interests, an application of about 5,000 tons of sewage per acre per annum to meadow or Italian rye grass, would probably in the majority of cases prove to be the most profitable mode of utilization, though the quantity would have to be reduced, provided experience showed that the water was not sufficiently purified; and it is pretty certain that the farmer would not pay ¾*d.*, and it is even very doubtful whether he could afford to pay ½*d.* per ton the year round for sewage of the average strength of that of the metropolis delivered on his land.

"6. That the direct result of the general application of town sewage to grass land would be an enormous increase in the production of milk, butter, and cheese, whilst by the consumption of the grass, a large amount of solid manure, applicable to arable land, and to crops generally, would be introduced.

"7. That the cost or profit to a town of arrangements for the removal or utilization of its sewage must vary very greatly, according to its position, and to the character and levels of the land to be irrigated. Where the sewage can be conveyed by gravitation, and a sufficient tract of suitable land is available, the town may realize a profit; but under contrary conditions it may have to submit to a pecuniary sacrifice to secure the necessary sanitary advantages."

With regard to the composition of town sewage diluted with water, the composition of the Rugby sewage is given. The average result of 93 analyses showed that the sewage waters contained 87½ grains of solid per gallon, half being dissolved and half suspended; of the suspended matter four-sevenths was inorganic, and three-sevenths organic; of the dissolved matter, one-fifth was organic, and four-fifths inorganic. Of the ammonia, one-fourth was in suspension and three-fourths in solution. The amount of ammonia was, on an average, 6¼ *grains per gallon. The amount of sewage (including, of course, the water of removal) was for each inhabitant about* 60 tons annually, which would contain 12½ lbs. of ammonia. But reviewing other analyses, and checking this result by other data, the authors conclude that an average person of a mixed population will give to sewage water more than 10 lbs., but probably less than 12 lbs. of ammonia per annum, and that the estimated annual value of the sewage from one person would be 8*s.* 4*d.*, or if the ammonia is taken only at 10 lbs. per head per annum, the annual value will be 6*s.* 8*d.* To express the amount in another way, the annual sewage of an average individual, if containing 12½ lbs. of ammonia would be equal to ⅔ cwt. of Peruvian guano; if containing 10 lbs., to ½ cwt. The result of all these experiments is to show that the value of diluted town sewage is less than was formerly supposed—an important consideration for towns which are now occupied with this difficult question.

A number of experiments were made to determine how far the manurial or putrescible constituents of the sewage were taken up by the land in their passage over and through it. The results were interesting. In two samples of sewage there were 8·66 and 8·78 grains of ammonia per gallon; after passing through the land the drainage water gave only ·98 and ·92 grains of ammonia; nearly the whole of the ammonia was retained.

The total inorganic matter was 91·26 and 98·22 grains per gallon in the two samples of sewage; in the drainage water it was 37·52 and 40·75 grains; the total organic matter was 51·6 and 42·4 in the sewage, and 7·8 and 7·05 in the drainage water after traversing the land. Two-thirds or three-quarters of the phosphoric acid and potash were retained, but less of the soda; the lime and the sulphuric acid were actually increased. The soil was light and gravelly, with a gravelly subsoil, but the authors consider that such a soil is quite as well, if not better adapted to purify sewers, as a stiffer soil.

Supposing that on an average 5,000 tons of sewage was given annually to each acre, and that there may be reckoned 60 tons of sewage annually per head, an acre of ground would receive the sewage of 83 persons. At Croydon, where the system has been practically worked, 250 acres received the excretion of nearly 20,000 persons; this gives exactly the excretion of 80 persons to one acre. Of course there will be differences, according to the dilution and to the soil, but these numbers are useful in judging of the amount of land necessary to be used.

In applying sewage to land, all systems of pipes, hose, &c., appear to be now given up as being too costly.

Mention was made in the Report of 1861 (Army Medical Report for 1861, vol. 3, p. 320) of the system adopted at Hyde by the Patent Eureka Manure Company. The Company is still going on, and therefore must be presumed to pay its way; but an analysis of Lawes and Gilbert would seem to show that the profit cannot be very great, as a sample of the manure analyzed by them showed only between 1 and 2 per cent. of ammonia.

A dry system is now being tried in Hampshire by a company lately established to carry out a plan devised by Mr. Taylor, of Romsey. Below the seat of a common privy, a revolving turn-table is fixed, which is caused to rotate either by the opening of the door or moving of the lid of the seat. Above the seat a hopper is placed, as in Moule's earth closet, in which are put the ashes of the house. When the place is used the soil and urine fall on the turn-table, and the latter runs off into a receptacle; the lid being replaced, the revolving table rotates a little, and at the same time ashes fall on it from the hopper above. When the next person uses the place, the table is moved round a little more, until, by the time the circle is completed, the mixed soil and ashes have become almost dry; a projecting knife then scrapes them off on to another table, and eventually they fall into a receptacle which is removed from time to time. The separation of the urine and solid is thus effected. A current of air is allowed to pass through the space below the seat, so as to carry off effluvia, and so assist in drying the soil. Time only can show if this plan is profitable; it may prove so if the urine can be used.

An interesting pamphlet has been published by Mr. Fawcus, of the Bengal Medical Service, giving an account of some experiments made in the jail of Alipore, to determine the amount of earth and the value of different kinds in the deodorization of fœces.

A curious fact has come out from these observations, viz., that the prisoners in the jail at Alipore (Bengalese it is presumed) have an alvine excretion much greater than Europeans in their own countries. Thus the alvine excretions in Europe is generally supposed to average for each male adult five or six ounces avoirdupois in 24 hours. The alvine excreta of about a dozen Bengalese being weighed every day for a week, gave an average of 12 ounces daily; the urine being 40 ounces. Mr. Fawcus mentions that the fœces were evidently very watery. The vegetable diet is probably the cause of this.

The amount of earth found necessary to render pulverulent and odourless the daily evacuations of one man (12 ounces avoirdupois) was 2½ seers. (equal to 5·1 lbs. avoirdupois). The earth was more efficacious when it contained much (vegetable) organic matter or humus; when it contained little organic matter it required a longer time before the fœcal smell disappeared. For urine, 8·2 lbs. avoir. of earth were required to every 2 lbs. of urine; if the urine was mixed with this earth while fresh, it did not putrefy.

Some experiments were made with fresh charcoal; 12 ounces of fœces were mixed with 16 ounces of charcoal; the mixture was inodorous, and water allowed to pass through it was quite inodorous; spirits of wine being then passed through took up a dark brown substance, which on evaporation had a fœcal smell. The author concludes that the charcoal retains the fœces something in the same way as it takes up strychnine from beer.

It was found necessary to mix the fœces intimately with the earth; merely covering with earth lessened the smell, but putrefaction set in.

Spread of the Specific Diseases.

Speculations as to the Nature of the unknown Specific Agents.—The nature of the peculiar agencies which cause the specific and infectious diseases, continues to excite great speculation. The action of carbolic acid on cattle plague in particular, has been held to give considerable force to the hypothesis which looks on these agencies as minute forms of independent life The action of the tar acids is peculiarly on low forms of life, and not on pure chemical processes, and as it certainly destroys the vaccine and cattle plague poisons, it is inferred that the germs it annihilates are really the poisons. If we, however, admit, and we may readily do so, that there are strong arguments for Pasteur's view of fermentations, and extend this view to the animal poisons, we must also admit that

we are still a long way from a scientific demonstration. We cannot in the least believe that Dr. Lemaire is entitled to speak in the positive manner he does on this point.

"I believe I have demonstrated," he writes, "that the ferments, the virus, and the miasms, are living beings, and that the air is the vehicle of the ferment."—De l'Acide phénique, p. 202.

This intricate question is far from being thus summarily settled.

Mr. Crookes is far more cautious, and his opinions, clearly and tersely given, are very much those which have been gradually gaining ground of late years among most medical men. It will be interesting to show the light in which a pure chemist regards this question.

"As to the bare fact of the infectious nature of the cattle plague all are agreed. That contamination of some kind is communicated from a diseased to a healthy animal is obvious to every one; but when we inquire by what agency the disease is carried, the answers are of the most conflicting kind. Something, evidently a material substance, passes from one beast to another; but what is this something? Is it a solid, a liquid, or a gas; living or dead; an animal or a vegetable germ; a poison, virus, or ferment? Each of these views has found advocates, and in favour of each something may be said.

"There are weighty reasons for deciding that the infecting matter is neither a gas, nor even a volatile liquid. The almost infinite attenuation which a gas undergoes owing to its rapid diffusion into the atmosphere, would render its supposed noxious influence imperceptible a few yards from the focus of infection. Moreover, the infection is capable of being carried considerable distances in clothing or running water, and in a variety of ways incompatible with the behaviour of gases. For these reasons, and many others unnecessary to adduce here, it seems clear that the disease must be communicated by the agency of solid, *non-volatile particles*.

"The specific *diseases producing* particles must, moreover, be organized, and possess vitality; they must partake of the nature of *virus* rather than of *poison*.* No poison yet known to chemists can approach, even in a faint degree, the tremendous energy of the active agent of infectious diseases. A poison may be organic, but it is not organized. It may kill with far greater rapidity than the virus of infection, but, unlike this virus, it cannot multiply itself in the animal economy to such an extent as to endow within a few hours every portion of its juices with the power of producing similar results. A virus, on the contrary, renders the liquids of an infected animal as virulent as the original germ. Strychnine may be regarded as the type of a poison, and vaccine matter as the type of a virus.

"Many considerations tend to show that the virus of cattle plague is a body similar to vaccine lymph, and consists of germinal matter, or living cells, possessing physiological individuality, which if not exposed to extremes of heat, cold, or dryness, are capable of preserving their activity for a certain time outside the living organism, of adhering to material objects, and of being carried from one place to another by currents of air; each, when introduced into the blood, requires a certain time (known as the period of incubation) during which the septic germs develope and multiply, until they have so far poisoned the blood that the ordinary symptoms of disease become manifest.

"The blood poisoning thus set up may legitimately be called 'fermentation;' it is a decomposition caused by the act of nutrition of the living cell, whereby it reproduces in incalculable numbers the specific septic germs which have given it birth. These gradually infest the blood and other animal liquids, and as the disease progresses are discharged from the skin, throat, glands, &c.; the breath, perspiration, and excreta of the animals forming vehicles for the distribution of the virus. By 'living' cells, is not meant living, in the sense in which an animal, or even a low form of infusoria lives; but living as a seed, or as vaccine matter, even when dried, may be living, inasmuch as it still possesses reproductive vitality.

"It is by no means certain that the multiplication of these individual cells

* The words *virus* and *poison* are generally regarded as synonymous. It would be more convenient, and would tend to promote accuracy of thought, were the distinction here made generally adopted.

is the immediate cause of the blood poisoning. The analogy of the action of virus on the blood to that of yeast on sugar, renders it more probable that this is not the fact. In the case of the best known ferment, yeast, its cells multiply by feeding upon the sugar in the liquid; alcohol and carbonic acid being their excretions. It is therefore probable that during the multiplication of the virus cells, they, in a similar manner, impoverish and weaken the blood, by feeding upon some element in it, whilst at the same time they excrete a poison to which the symptoms of the disease may be immediately due.

"The foregoing view differs from the prevalent notion that the virus of contagion consists of decomposing organic matter, declining from a complex towards a more simple chemical constitution, and during its degradation inducing decomposition in the neighbouring particulars of matter. This chemical theory at first sight appears very plausible; but it fails to satisfy one necessary condition of the present case. It is possible to imagine that the force set free in the declension of a complex chemical molecule to a more simple form will be sufficient to raise a neighbouring molecule to a structure almost as complicated as the original; but according to this view the ferment would be constantly diminishing, whereas in reality it constantly increases in bulk. The hypothesis is, therefore, insufficient to explain the prodigious procreative power of the original particle. This power belongs only to the nature of an organized germ, capable of producing multiples of itself by a process of nutrition and subdivision. Thus the line of demarcation between organic poison and organized virus appears to be very clearly defined.

"This necessary brief outline of the theoretical views which have governed me in the present investigation will, it is hoped, be clearer and more intelligible after perusing the experimental proofs which follow. They have been corroborated by numerous small laboratory experiments, as well as by practical operations at different farm houses.

"Whether this theory thus briefly sketched be adopted or not, or whether it be regarded as a provisional scientific artifice, it certainly includes and explains a far greater number of the phenomena of pestilence than any other hitherto propounded. Moreover, it is the theory sanctioned by the most influential of those medical philosophers who have the best right to be heard on this subject, and notably by the distinguished Registrar-General, Dr. Farr, who by the adoption of the word zymotic, in his classification of diseases, has implied his adhesion to this theory.

"Bearing upon the communicability of this disease are other questions, which hitherto have not received a satisfactory settlement. How does the virus travel? What amount of resistance to ordinary conditions of moisture and time does its vitality confer upon it? Will it propagate and multiply, outside the animal body, under favourable conditions of warmth and moisture? And can we find any chemical disinfectant or antiseptic which will readily destroy it?

"The extreme communicability of the pestilence may arise either from the eminently diffusible character of the virus-cells, or from their persistent vitality, or from both conditions combined. It is proved that the *materies morbi* will adhere to clothing, and can be carried a considerable distance in it; that the breath, perspiration, and evacuations of the diseased animal are loaded with virus-cells; and that the secretions from the mouth, nose, and eyes, are in a similar condition. It follows, therefore, that the sheds in which diseased animals have stood, become impregnated with the virus, ready to settle on the clothes of every one who enters; that ponds, streams, and even wells, may become contaminated through foul soakage; that a road, over which diseased cattle have been driven, may be poisoned along its whole distance by the evacuations and other discharges from the animals; whilst their very breath, carried by the wind, may plant the seeds of infection in all the healthy farms by which the road passes.

"There is no difficulty in admitting that the infection may travel for a certain limited distance through the air, and it is even likely that it may be carried longer distances by fogs, or heavy vapours, or by the gases of putrid decomposition; but it appears in the highest degree improbable that the germs should be able to retain their vitality for any length of time in the atmosphere.

"Sufficient data do not at present exist to decide whether the germs can propagate themselves apart from the animal. Viewing them as of the nature of a ferment, it is not impossible that they may live and multiply in other warm liquids beside the blood; but the most reasonable supposition seems to be that the presence of decaying organic matter, or the gaseous emanations from putrefying dunghills, preserves, or may even revive, the expiring vitality of germs brought by men, dogs, birds, vermin, or perhaps the wind; whilst the same causes which foster the virus-cells,—dirt, overcrowding, constant re-breathing of their own and the adjacent animals' breath, an insufficient supply of fresh air, the presence of ammonia and other gases of putrefaction, together with inappropriate food,—may establish a deteriorated state of body, which causes the animals to fall ready victims at the first approach of the plague.

"The existence of these unfavourable conditions may account for the fact that on some farms the disease assumes a character so virulent that no remedy or preservative is of any avail against it, every head of cattle being swept off one after another, each attack being fatal within three days. In the words of a writer in the Edinburgh Review, 'a single spark of infected matter accidentally thrown into the animal economy, thus reduced as it were to a touchwood state, fires the mass, which burns until it is consumed.'"—*Third Report of the Cattle Plague Commissioners, Appendix.*

If the power of multiplication undoubtedly possessed by the poisons of the specific diseases is not owing to forms of independent life, a distinction would have to be drawn between common fermentations, which are owing to independent organizations (if Pasteur be correct) and the action caused by the reproductive powers of animal poisons. Our knowledge is so slight, that any further discussion of the subject would lead no further. I will only remark two points.

If the specific agent of cattle plague be an independent organism, giving rise in the body to a peculiar fermentation, it cannot be detected microscopically. Dr. Beale has examined this point very carefully, and though he has found plenty of fungi, Bacteria, &c., these are all evidently secondary, and are not the cause. I believe the smallest grown or recognizable infusoria are probably some of the Bacteria. The length of the chain of the Bacterium triloculare is about $\frac{1}{18000}$ of an inch, and a single corpuscle measures $\frac{1}{111320}$. The corpuscles of some kinds of vibriones (V. synxanthus and V. syncarrus) are $\frac{1}{50000}$ to $\frac{1}{70000}$. Now Dr. Beale's powers (2,800 diameters) would discover bodies more minute than these, so that if infusoria or fungi were the cause of cattle plague, it is impossible to suppose they would be overlooked.

That the virus of cattle plague may be living matter, though the particles have no organized form, is possible; but if so, we have still a very imperfect conception of the mode of action. Dr. Beale has attempted to define this view, and it will no doubt be interesting to those who are not able to read his Report to the Cattle Plague Commissioners in the original, to give as long an extract as we can.

"We have now to inquire how the wonderful increase in the poison is brought about. There are two views essentially different from one another, which may be supported by different arguments.

"1. It might be maintained that the contagious material actually passing into certain portions of the living germinal matter of the organism might excite in these new actions, and cause them to divide and subdivide very actively, and communicate to them the same properties which the original particle possessed, somewhat in the manner in which the wonderful powers existing in connection with the germinal matter of the spermatozoon are communicated to that of the ovum and affect to some extent every one of the multitudes of masses resulting from the division of the first.

"2. The contagious particle or particles having gained access to the fluids of the uninfected organism may absorb nutrient matter, grow and multiply, giving rise to a progeny exactly like themselves in every particular.

"It is open to discussion which of these two views is supported by the greatest number and most pregnant facts. I incline strongly to accept the latter as the more probable of the two.

"It may, however, be fairly asked, when a pus corpuscle from the surface

of the conjunctiva of a person suffering from purulent ophthalmia, or when a particle of gonorrhœal pus comes into contact with an uninfected conjunctiva and grows and multiplies, establishing a similar morbid condition to that in operation upon the surface where it grew, if the multitudes of resulting pus corpuscles are its direct descendants or are derived from the germinal matter of the cells of the conjunctiva affected.

"It seems to me probable that the corpuscles capable of exciting a new action upon an unaffected surface are the direct descendants from the original corpuscles which excited that action. Not only so, but I believe they take the nutrient material which was destined for the nutrition of the normal cells, and live at their expense. Just as in the case of cancer, the adventitious, rapidly growing germinal matter takes the nutriment destined for the normal tissue, and even feeds upon the latter in consequence of its powers of growth being much more active.

"It is most probable, I think, that in the case of specific pus corpuscles growing upon a mucous surface the germinal matter of the normal cells may increase and multiply too. Indeed, in some instances I am sure that this is the case. And it therefore follows that not every one of the pus-like bodies formed is capable of exciting the specification, but the specific bodies outstrip in the rate of their multiplication, to so great an extent, the masses of normal germinal matter, that the number of descendants of the latter would be extremely insignificant and would soon be completely overwhelmed by the former.

"Upon the whole, then, I venture to think that the millions of contagious particles produced in the organism in an eminently contagious disease, are all the direct descendants of the very few, or perhaps even single particle first introduced; just as the millions of Bacteria and fungi developed in certain decomposing organic matters in the course of a few hours may have been produced from one or a very few particles. And that although in the secretions upon the mucous surfaces, and in internal parts, there may be many masses of germinal matter resulting from the increased access of pabulum already many times referred to, that these latter do not form the active elements of the contagious material or contagium, but that this is constituted of the other particles only.

"*Question concerning the possibility of the particles of contagium passing into the substance of normal living germinal matter.*—It is true that in the substance of many masses of germinal matter found in the secretions and discharges of animals dying with cattle plague, and of many other diseases, some minute particles which would ordinarily be termed granules, which refract the light very highly, and probably have been often mistaken for minute oil globules, may be invariably observed in great number. The nature of these particles is not known. They are met with in almost all kinds of living matter with which I am acquainted. It seems to me probable that some of these particles have been germed in the germinal matter itself, while others have passed into it from without.

"Now it is certain that such particles are very numerous, and commonly found in masses of germinal matter so situated as to render their entrance from without, not only possible, but probable. The fact of the amœba opening itself as it were, and then enclosing upon foreign particles, and embedding them in its very substance, is well known. Nor is this a phenomenon not peculiar to the amœba, but possessed by other kinds of germinal matter. And now that the supposed importance and even the actual existence in many cases of the cell-wall have been disproved, and the active, spontaneous movements which used to be called amæbiform, because it was supposed they were peculiar to the amœba, have been proved to be common to all kinds of living matter, it is probable that this and other properties, equally characteristic of all kinds of matter in a living state, will be admitted.

"It must therefore be regarded as at least possible that particles of contagious living matter less than the $\frac{1}{100000}$ of an inch in diameter might pass into the substance of a white blood, lymp, or chyle corpuscles, and thus embedded, the particle might be carried to all parts of the system. The matter itself might increase and multiply in the corpuscle, destroying it and living at its expense until the new collection attained a size larger than that of the corpuscle. Or, the foreign living particles in the white blood corpuscle might

interfere with its division and subdivision, and the germinal matter of the corpuscle itself, attain a size larger than ordinary. Or the presence of the bodies supposed might cause the death of some of the particles of germinal matter and the formation of oil globules and other substances which might go on accumulating in the white corpuscle until it became too large to traverse the smaller capillaries. The phenomena above referred to, would not only seriously interfere with the growth and nutrition of the white blood corpuscle, but would prevent the material undergoing conversion into red blood corpuscles. And in consequence of the diminution of the red blood corpuscles, and the reduction of the total quantity of blood in the system, various secondary phenomena would follow.

"But in whatever way the minute particles of germinal matter supposed to be included in the white blood corpuscle may cause their enlargement or interfere with their function, impediment to the free circulation of the blood in the capillaries must be induced. The particles now stationary would rapidly increase and multiply, and some might make their way through the vascular walls towards the surface or into the surrounding textures.

"The minute particles imbedded in the germinal matter sometimes so closely resemble minute vegetable germs that in some cases it is difficult to believe they are not of this nature, and have gained access from without. But on the other hand, I am quite certain that some of these minute highly refracting particles embedded in the white blood corpuscles and some other masses of germinal matter are formed from the germinal matter itself, and are closely allied to fibrin.* I am, however, not able without further investigation to pursue this part of the inquiry.

"Without, therefore, pretending to be able to identify the actual *materies morbi* of the cattle plague, or to distinguish it positively from the other forms of germinal matter present in the fluids, on the different free services, and in the tissues in such vast number, I think the facts and arguments advanced in this paper tend to prove, first, that it is germinal matter; secondly, that the particles are not directly descended from any form of germinal matter of the organism of the infected animal; third, that it is capable of growing and multiplying in the blood; fourth, that the particles are so minute that they readily pass through the walls of the capillaries, and multiply freely in the interstices between the tissue elements or epithelial cells into which they pass; and lastly, that these particles are capable of living under many different conditions—that they live and grow at the expense of various tissue elements, and retain their vitality, although the germinal matter of the normal textures after growing and multiplying to a great extent has ceased to exist."—*Third Report of the Cattle Plague Commissioners, Appendix.*

That even complex living structures will live after separation from one animal if they are immediately brought under the nutritive influence of another, is certain, and pus and other cells will do so likewise, and will attract in this foreign locality nutritive material, and grow and increase as if still in their place of birth. That some diseases are propagated in this way is probable, and certainly we have here an approach, though a very faint one, to the astonishingly quick growth and reproduction of the so-called zymotic poisons. The animal poisons generally produce purulent or pyoid discharges from mucous surfaces on the skin, which discharges contain the poisons; but if any one were inclined to generalize from this common fact, and to believe that abnormal cell forms contained the poisons, his belief would be rudely shaken by the phenomena of cattle plague. For a discharge virulently contagious may contain no cell-form, and the poison appears to reside in granular or formless particles.

If these formless particles are endowed with life and potential powers of growth, and we will neither deny nor affirm this, we can conceive that they may grow like a pus cell grows, if it is placed in a position where it can attract proper nutritive material. But what we cannot understand is why it does not then grow to some recognized form. If we choose to translate our words, for it is no more, and to call such living and growing matter germinal, it

* See my paper "On the Germinal Matter of the Blood with remarks on the Formation of Fibrin." Trans. Mic. Soc., Dec., 1863.

is at any rate the germ of something. It will form, we must suppose, something recognizable; but as far as cattle plague is concerned, it appears not to do so. Are our instruments still too imperfect, or have our powers of observation failed us in tracing the form which the cattle-plague poison acquires in its growth?

I quite agree with Mr. Crookes in thinking that the purely chemical hypothesis is unlikely; but we are not, it seems to me, one step nearer to the solution of the question of the real nature of these poisons than we were before the cattle plague outbreak. We knew before that the powers of reproduction possessed by these poisons could not be connected with common chemical decomposition or putrefaction, and that in some not understood way they are vital; we understand no more now, and shall not do so until our ideas of growth and life are more defined.

Although Beale's careful and minute investigation seems entirely to negative the idea of Bacteria, or similar infusoria, being at all concerned in cattle plague, and though Davaine's statements of the splenic apoplexy of sheep being dependent on Bacteria are in all probability incorrect, M. Méguin* believes he has found that the typhoid affection (l'affection typhoide) of the horse is produced by Bacteria, which are found in the blood, and cause a peculiar diffluence of the blood, and an alteration of the globules which adhere by their borders and en masse. This blood when used for inoculation communicates the disease to other animals.

That the blood of the "typhoid" horse can give the disease to other animals, is confirmatory of Sanderson's most valuable discovery that the cattle plague serum has this power; but M. Méguin in proving this has by no means settled the question whether the contagious power is owing to the Bacterides.

Schönbein† has lately directed attention to the fact that vaccine matter has a most energetic action on peroxyde of hydrogen; oxygen is rapidly given out, and the vaccine matter becomes quite inert presumably from oxidation. The same action on peroxide is exerted by fungi and low organized forms. I have found that cholera stools have this power in a great degree, but whether this is owing to the vibriones which swarm in them, I do not know. Almost any rapidly decomposing putrid substance has the same effect on peroxide of hydrogen, but here also organic forms are always present.

Schönbein conjectures that a special ferment (not dependent, he thinks, on independent life, for he is no follower of Pasteur) exists for each infectious disease, but he does not seem aware that this is a very old opinion, which unfortunately still waits for scientific proof.

The Several Specific Diseases.

Yellow Fever.—A very decided case of importation of yellow fever into Swansea‡, has added some more evidence to that already known. At present there is a large trade between Cuba and Swansea in copper, and it is not at all uncommon for vessels coming from Cuba to lose some of their crew from yellow fever on the voyage; but the disease has never till last year been known in Swansea. The "Hecla" arrived from Cuba on the 9th September, 1865, having had several deaths on board from yellow fever, and having persons sick on board from the same disease. One man was landed with it, who died soon afterwards. The quarantine regulations were evaded, and the discharge of the cargo was at once commenced. On September 15th, a case of yellow fever occurred in an inhabitant of Swansea, and up to October 4th, 22 decided and 7 doubtful cases had occurred in residents. The weather at the time was unusually hot. Of the certain cases, 15 died (besides the case of the sailor who was landed); of the doubtful cases, one died. Of the nature of the disease there was no doubt. That this fatal outbreak was really owing to the "Hecla," is clear from the following extract from Dr. Buchanan's Report.

"As to the connection of the disease with the 'Hecla,' the evidence ap-

* Comptes Rendus de l'Acad., T. lxii., No. 18.

† Zeitsch: für Biologie, Band. I., p. 273.

‡ Report of Dr. Buchanan to the Medical Officer to the Privy Council, in Report of latter to the Privy Council, 1866.

pears conclusive, (a) From the fact that there had been for months no other vessel in the harbour that had had any yellow fever on board; (b) From a consideration of dates. A vessel which has acknowledgedly lost part of its crew from yellow fever, and which lands a man on her arrival to die of that disease in a few hours, enters Swansea on Sept. 9th, and remains there till Sept. 28th. From Sept. 15th, six days after her arrival, to Oct. 4th, six days after her departure, cases of a disease previously unknown at the port break out, with the symptoms and fatality that mark it for yellow fever. The vessel leaves the dock on Sept. 28th, and takes up a distant position near the harbour mouth, and from Oct. 4th to Oct. 23rd, the date of this report, there is no fresh case; (3) The locality where the disease occurred again connects it with the 'Hecla.' In a town of 30,000 people, some 18 cottages are scattered on a little low-lying island, to which the vessel importing yellow fever comes, and on which she discharges her cargo. Of the 22 cases of the fever (excluding doubtful cases of it) that subsequently break out, 11 occur in persons resident on the little island, five in persons who, living elsewhere in the town, have their daily work on the island, three in men occupied about shipping in the North Dock, and only two cases occur among the whole population of the large town who had no direct connection with the island. But even these two cases occur in persons living within 150 yards of the ship, across the dock, and living in the next house but one to the cottage where the man died who was taken from the vessel on her arrival.*

"Among the cases of yellow fever recorded in the following pages will be found one of much interest, where a vessel lying close to the 'Hecla' while her cargo was discharging, left Swansea for a neighbouring port, and there lost two of her crew of four, one of them certainly from yellow fever.

"But it is remarkable that the Bristol and Swansea pilots, the five seamen who helped to bring the ship into harbour, the custom-house officers and men, and almost all the men employed in discharging the 'Hecla's' cargo escaped an attack of the fever (the after history of most of them being known) although they had much more direct dealing with the ship than the persons who were attacked. For this circumstance no explanation can yet be offered, but it is one which has many parallels in etiological research, and cannot be held to constitute a material difficulty in affirming the connexion between the 'Hecla' and the fever on shore.

"During this period an almost tropical heat prevailed at Swansea, and no rain fell. Probably the climatic conditions that foster yellow fever in the West Indies have never been better imitated in Great Britain. The locality too, where the cases occurred, a low-lying alluvial island at the mouth of a river, is such as is particularly favourable to the disease in its native latitudes."

Precautions against Yellow Fever at Swansea.—Although the yellow fever was thus introduced by the "Hecla" there was very little, and indeed no satisfactory evidence that the disease was propagated on shore from the persons who were attacked. It seems indeed clear from this case as well as from that of St. Nazaire (see Army Medical Report, vol. iv., p. 342), that in these cool climates the disease is seldom carried by persons, and there is, therefore, not much danger of its spreading among the population. But it is otherwise in the tropics, as the instance of Bona Vista showed.

In cool countries the great danger is evidently the ship itself and its immediate neighbourhood. The "Hecla" being removed no fresh case occurred afterwards, although before her removal "fresh people were coming under inspection from day to day." Chlorine gas was tried as a disinfectant, but apparently without benefit. Nitrous acid gas was not used. The wood-work was subsequently washed all over with solution of chloride of lime, and the bilge was also mixed with chloride of lime and pumped out; the copper ore was also washed with the same solution. These measures seem to have been useful.

Cholera.—Although the transport of cholera by persons has long been admitted, and was indeed earnestly insisted upon by several writers as early as

* Of the seven doubtful cases five resided on the island; one was occupied in a vessel alongside the "Hecla;" and the remaining one (one of the most questionable of all the doubtful cases) alone had nothing to do with the docks or island.

1830, or even before, and though the observations in Germany, in 1849 and 1854, carried conviction to the minds of many persons who had previously doubted the frequency of the occurrence, the experience of the past year is still more convincing. Indeed, it would seem doubtful if in 1865 and 1866 the cholera has spread in any other way than by human intercourse; there is observable no indication of that regular course and extension over Europe in a determinate direction which was so marked in 1832 and 1848-9; and which seemed to point to some more general condition than the movement of men; some condition which not only impelled it in a certain direction, but gave it a definite though certainly (if one place be compared with another) a variable duration in each country. The present epidemic, if that term may be given to it, has much more resemblance to the condition of things in India, where the disease is constantly carried about, but varies in prevalence in different years in accordance with the amount of movement, aggregation of men, and certain varying physical conditions, the most important of which appear to be temperature and the degree of moisture and the level of subsoil water in the ground; the soil water-line, so to speak. Although the supposition is rather strained, it may be that had we known more completely in former years the way in which cholera is ordinarily spread we might have had less difficulty in finding the cause of what did certainly seem a very mysterious extension and subsequent disappearance of cholera over Europe.

I do not propose here to give a complete account of the outbreak of 1865-66, but merely to notice a few points in its history.

It appears certain that the pilgrims returning from Mecca carried cholera into Syria and Egypt; that they also carried it in the first instance to Mecca is probable, since it certainly existed at various places (Aden and other towns on the Arabian coast) on their route. At Mecca the immense and filthy crowd, numbering, it is stated, nearly 70,000 souls,* gave the poison its condition of spread in an intense degree, and there was an enormous mortality. In Egypt it so happened that the spring and summer of 1865 were particularly favourable for its spread;† the temperature was unusually high; hot winds were frequent; the Nile was much lower, and the water supply was less than usual. At Cairo, we are told, "the Nile was one large cesspool," and the water used by the natives was obtained from the most contaminated part of the river.

The exact route in Syria and Egypt is not, I believe, perfectly known; it affected Damascus, Bagdad, and Beyrout early, but perhaps after Alexandria. Cairo was attacked some eight or ten days afterwards and then Damietta.

From Alexandria it spread to many ports on the Mediterranean littoral and beyond it—to Constantinople, Malta, Ancona, Marseilles, Gibraltar, Southampton, &c. The introduction into Malta and Gibraltar is elsewhere recorded in this volume, and I will merely refer here to the introduction into Constantinople, Marseilles, and Southampton.

It appears certain that it was introduced into Constantinople by the Imperial steam ship "Monkbir Sourrour," on the 28th June, 1865.‡ Although the crew was reported to have been quite healthy, cases of "cholerine" had occurred while she lay in the port of Alexandria, and on the night after the arrival at Constantinople twelve of the crew were landed and taken to the hospital, Cassim Pasha, one case was cholera, the rest were cases of "cholerine." Two, three, or four days afterwards, the time is not quite certain, a case of cholera occurred in Constantinople, in a soldier who had been on duty at Cassim Pasha, and from him it spread in the barracks. The earliest cases among the civilians were also all connected, directly or indirectly, with the hospital, and Mr. Leach informs us that the Constantinople physicians believe they could trace the disease from locality to locality in every or almost every case.

The introduction into Marseilles is most instructive.

Cholera was officially declared present in Marseilles on the 23rd July, 1865, and at first the exact mode of introduction could not be traced. M. Grimaud

* They have been stated at 700,000, but this is believed to be a mistake.
† Cholera Prospects, by Tilbury Fox, M.D., Pamphlet, 1865, p. 9.
‡ On the Epidemic of Cholera in Turkey, by Harry Leach. Pamphlet, 1866.
§ Comptes Rendus, 1865 and 1866, T. lxi., p. 591, and T. lxii., No. 19.

de Caux, by a most searching enquiry has proved§ that the first death actually occurred on the 12th June (nearly six weeks before the first officially reported case) and was in an Arab pilgrim who was landed from the "Stella," a vessel carrying pilgrims from Alexandria, and on board which two deaths from cholera had occurred. Besides the pilgrims who died at Marseilles other pilgrims landed, and all went to one particular part of Marseilles. It was in this part, close to the houses where the pilgrims were received, or in those very houses, that the earliest cases in inhabitants occurred.

In Southampton the evidence was less complete;* probably the earliest cases were overlooked. There was merely a probability, indeed a strong probability, that the disease was introduced by the Peninsular and Oriental steamers, some of which ran into Southampton with cholera or cholerine on board, or having had deaths from cholera immediately before entering the port.

The disease has been also transported across England to Liverpool by German emigrants in a most unmistakeable way.

A very singular local outbreak occurred at Theydon-Bois, in Essex, in which no less than eleven persons were affected; it appears clear that this was a case of introduction of the disease by a person ill with cholera and subsequent impregnation of the drinking water by the choleraic stools and propagation of the disease by water; at least in most of the cases.

In Germany there were in 1865, some striking cases of importation. Pettenkoffer† records the following: A lady with her child arrived in Altenburg, in Saxony, on the 25th August, 1865, after an uninterrupted journey of nine days and nights from Odessa, where no cholera at that time prevailed to the knowledge of the lady, though it was prevailing in the Turkish border through which they passed. The child had, however, suffered from diarrhœa in Odessa, and became much worse after her arrival at Altenburg. On the 27th August the lady, who up to that time was quite well, was attacked and died on the 29th with unequivocal Asiatic cholera. Now, in this inland place there was no cholera whatever within hundreds of miles except this imported case. On the 29th August the sister of this lady, who had not been out of Altenburg, was attacked with cholera and died in twelve hours. From this house the disease was proved to have spread.

Pettenkoffer proceeds to show that the local conditions of Altenburg were favourable to the spread of cholera, especially in respects of the soil and the level of the subsoil water and the impure condition of the soil itself.

Pettenkoffer records also other instances of introduction.

Precautions against Cholera.—At Southampton, in 1865, the disinfection of the choleraic stools by chloride of lime, chloride of zinc, and carbolic acid was attempted, but was carried out rather imperfectly. On the whole, however, some share in the speedy cessation of the epidemic might be assigned to this measure. At the cholera hospital in Altenburg Pettenkoffer used solution of sulphate of iron for the discharges and chloride of lime for the linen. These measures seemed useful, at least the disease did not spread from about fifty very severe cholera cases, which were treated during two months in the ground floor, to any of the other sick persons (eighty in all) or attendants, who lived on the upper floors. There was not, indeed, a single case of diarrhœa among them, though there must have been plenty of predisposed persons.

The only doubt is that the surrounding neighbourhood, which is densely populated, and seemed to present every local condition of cholera, also escaped, so that Pettenkoffer expresses a little uncertainty whether there may not have been some cause for the immunity of the hospital inhabitants other than the destruction of the stools.

The quantity of sulphate of iron to be added varies, of course, with the amount and character of the stools. It should be added in quantities sufficient to prevent ammoniacal decomposition. Pettenkoffer does not mention the exact amount placed in the vessels in which the cholera stools were received, and it will be best to add the solution till all ammoniacal smell and reaction are gone. Sulphate of iron must not be used with chloride of lime; they counteract each other.

* See Report by the Author to the Medical Officer of the Privy Council, in Report of latter, to the Privy Council, 1866.

† Zeitsch: für Biologie, Band 11, p. 80 (1866)

Carbolic acid is yet too dear in Germany to be much used, but Pettenkoffer considers it very valuable for cholera stools; he used one part in twenty of water; it prevents ammoniacal decomposition for a long time.

Typhoid Fever.—Dr. Buhl* has attempted to show that Pettenkoffer's theory of the propagation of the cholera poison by the agency of loose ground in which there has been a rather sudden change in the level of the subsoil water, so as to expose more decomposing or putrefying matter to air, and thereby to cause more effluvia, is true also for typhoid fever. He has brought into juxtaposition the deaths (not the cases) in typhoid fever in Munich in the ten years 1855-1864, with the varying level of the subsoil water during the same time. He shows first that the typhoid deaths (and presumably cases) were almost double in autumn and winter as compared with spring and summer (493 as against 252).

This is not attributable to temperature, nor, as Buhl shows, has it any connection with the amount of rainfall, but it is attempted to be shown that the oscillation in the level of the subsoil water and the intensity of typhoid, have a causal connection; the two series of events have an inverse ratio. When the level of the subsoil water rises the typhoid mortality (cases?) decreases, and the reverse. It is not the exact level but the mutations of the subsoil water which are of moment.

The evidence which Buhl analyses is certainly very interesting, but in all investigations of this kind there is one general failing. In order to show that two series of events which have a parallel course (supposing this point to be admitted in the case under consideration) are really connected by causation with each other, we require an exhaustive analysis of all other conditions, so as to be able to exclude all other possible influencing agencies. Otherwise we can never be sure that the presumed connection is anything more than a coincidence. In Munich also, as Buhl himself states, there is the probability of the drinking water being more impure during the months when typhoid is most fatal. It may not be the mere level of the soil water but its contamination which is the causal condition.

REPORT ON THE BARRACK-ROOMS, GUARD-ROOM, AND STABLES AT HILSEA.

By Staff Surgeon F. De Chaumont, M.D.

At Hilsea there are two batteries of Artillery; to wit:—
G Battery quartered in rooms over the stables.
E Battery quartered in separate huts, the stables being detached buildings.

First Experiment.

Nov. 15th, 1865, 1 A.M, Room 2, G Battery, over the stable, intended for 25 men, 21 men actually occupying it. Length 40 feet; breadth 28 feet; height 10·5 feet.

	Cubic Ft.
Gross cubic space	11,760
Deductions	417
Net cubic space	11,343

Which gave for 25 men (11,327 cubic feet), per man, 453 cubic feet; for 21 men (actual number) 540 cubic feet.

Ventilation: inlet acting,—

One stove louvre, 130 square inches; 1″25 + 2″75 ($\frac{1}{8}$″ taken). Rate of movement not measurable; no fire.

* Zeitsch: für Biologie, Band I., p. 1.

Outlets,—	Sq. In.
Two shafts (10″ × 10″), opening obstructed by a board, ⅛ only taken in consequence, rate not measurable	50
One Chimney	60
Total outlet	110
Inlet	130
Total inlet and outlet	240

This gives for 25 men, per man, 9·4 square inches; for 21 men, 11·4 square inches; actual discharge by chimney, 10,433 cubic feet per hour. Very strong smell of stables.

Results,—

Area (room space) per man	(25 men)	45 square feet.
Ditto ditto	(21 men)	53 „
Total inlet and outlet area per man	(25 men)	9·4 square inches.
Ditto	(21 men)	11·4 „
Delivery, not measurable		
Discharge for 25 men, per man per hour		417 cubic feet.
For 21 men, per man per hour		500 „

Carbonic acid,—

First time	1·028	in 1,000 volumes.
Second time	1·127	„
	2) 2·155	„
Average	1·078	„

Dry bulb, 60°·5; wet ditto, 59°·5. Dew point, 58°·15.
Elastic force of vapour, ·493.
Weight of vapour in a cubic foot of air, 5·5 grains.
Ditto, ditto, to saturate, ·4
Humidity (saturation 100), 94.

At 3·50 A.M.
Dry bulb, 58°; wet ditto, 56°. Dew point, 54°·2.
Elastic force of vapour, ·421.
Weight of vapour in a cubic foot of air, 4·7 grains.
Ditto, ditto, to saturate, 0·7 grains.
Humidity, 87.

Carbonic acid,—

First time	1·227	in 1,000 volumes.
Second time	1·200	„
	2) 2·427	„
Average	1·214	„

On the 16th November, at 11 P.M.:—Smell close.
Carbonic acid:—·804 in 1,000 volumes.
Dry bulb, 60°; wet ditto, 57°. Dew point, 54°·4.
Elastic force of vapour, ·423.
Weight of vapour in a cubic foot of air, 4·7 grains.
Ditto, ditto, to saturate, 1·2 grain.
Humidity, 82.

On the 17th November, at 3 A.M.
Carbonic acid:—·951 in 1,000 volumes.
Dry bulb, 60°; wet ditto, 59°. Dew point, 58°·1.
Elastic force of vapour, ·485.
Weight of vapour in a cubic foot of air, 5·4 grains.
Ditto, ditto, to saturate, ·4 grains.
Humidity, 94.

An experiment was instituted with Nessler's solution for the purpose of detecting ammonia, but none could be found.

Second Experiment.

Room 11, permanent hut separate from stable. E Battery, 15th November, 1865. 1·20 A.M. Length 60 feet; breadth 20 feet; height 9·5 feet.

Gross cubic space	11,400 cubic feet.
Deductions	293 „
Net cubic space (with 2,700 additions)	13,807 „

This gives for 25 men 13,795, or 552 per man. For 22 men 13,807, or 582 per man.

Ventilation: inlet acting,—

One louvre of air chamber of stove = 30 square inches; rate per minute not measurable. Twelve air-bricks (10″ × 6″) ⅓ taken, = 240 square inches; rate 63 feet per minute = 6,317 cubic feet per hour.

Outlets,—

Two shafts (10″ × 6″) ⅔ taken = 36 square inches; rate = 1053 cubic feet per hour; one chimney = 60 square inches; rate 300′ per minute = 7560 per hour. Total inlet and outlet area 366 square inches.

Results,—

Area per man, on 25 men	= 48 square feet.
Ditto, ditto, on 22 men	= 50 „
Inlet and outlet area, on 25 men	= 14·5 square inches.
Ditto, ditto, 22 men	= 16·6 „
Delivery per man, per hour, 25 men	= 253 cubic feet.
Ditto, ditto, 22 men.....	= 300 „
Discharge ditto, ditto, 25 men	= 345 „
Ditto, ditto, 22 men.....	= 400 „

There is a moveable window 18″ × 32″ over the door.

Carbonic acid :—

First time	·553 in 1,000 volumes.
Second time	·633 „
2) 1·186	
Average	·593

Dry bulb, 58°·5; wet ditto, 57°. Dew point, 55°·7.
Elastic force of vapour, ·444.
Weight of vapour in a cubic foot of air, 4·9 grains.
Ditto, ditto, to saturate, ·6 grains.
Humidity, 87.
No foul smell.
At 4 A.M., smell not very foul.

Carbonic acid :—

First time	·843 in 1000 volumes.
Second time	·796 „
2) 1·639	
Average..	·8195
Say	·820

Dry bulb, 56°; wet ditto, 53°. Dew point, 50°·2.
Elastic force of vapour, ·365.
Weight of vapour in a cubic foot of air, 4·1 grains
Ditto, ditto, to saturate, 0·9 grains.
Humidity, 81.
On the 17th November, at 1 A.M., raining outside.
Carbonic acid in ward, ·924 in 1,000 volumes.
Dry bulb, 59°; wet ditto, 58°. Dew point, 57°·1.
Elastic force of vapour, ·467.

Weight of vapour in a cubic foot of air, 5·2 grains.
Ditto, ditto, to saturate, 0·4 grains.
Humidity, 94.
At 5·15 A.M.:—Carbonic acid (men getting up), ·630 in 1,000 volumes.
Dry bulb, 57°; wet ditto, 55°. Dew point, 53°·2.
Elastic force of vapour, ·405.
Weight of vapour in a cubic foot of air, 4·5 grains.
Ditto, ditto, to saturate, 0·7 grain.
Humidity, 87.

Third Experiment.

An experiment was also made in the Guard Room, 15th November, 1865, 1·45 A.M. 16 men in the room; length 26 feet; breadth 20 feet; height 12 feet; cubic space (net) = 5768 = 360 per man.

Ventilation: Inlet,—1 stove louvre. Outlet,—1 chimney discharging (fire burning, 736′ per minute) 18,547 cubic feet per hour, or 1,160 per man per hour; besides doors and windows.

Carbonic acid:—

First time	·674
Second time	·683
2)	1·357
Average	·679 in 1,000 volumes.

Dry bulb, 62°·5; wet ditto, 60°. Dew point, 57°·9.
Humidity, 85.
At 4·10 A.M., 12 men in room. Carbonic acid:—

First time	·890
Second time	·909
2)	1·799
Average	·900 in 1,000 volumes.

Dry bulb, 58°; wet ditto, 57°. Dew point, 56°·2.
Humidity, 87.
At 3 A.M., 17th November. Carbonic acid, ·621 in 1,000 volumes.
At 5 A.M., ·568 in 1,000 volumes.
On both occasions:—
Dry bulb, 62°; wet ditto, 60°. Dew point, 58°·3.
Humidity, 88.

Fourth Experiment.

In the Lock-up there were five prisoners. Length 11 feet; breadth 10 feet; height 12 feet. Gross cubic space 1,340 feet. Per man (for 5 men) 268.

On the 17th November, 3 A.M., there was only *one man*. Carbonic acid ·468 in 1,000 volumes.
Dry bulb, 58°; wet bulb, 57°. Dew point, 56°·1.
Humidity, 93.
At 4 A.M., same.
Dry bulb, 59°; wet ditto, 58°. Dew point, 57°·1
Humidity, 94.
The cells gave 638 cubic feet per man, but were unoccupied.

Fifth Experiment.

Experiments were also instituted in the stables. Stable under No. 2 Room, G Battery, for 16 horses, has 32 ventilators. Net cubic space 10,472 cubic feet, or 655 feet per horse. (Here a horse is taken as occupying 25 feet).

Carbonic acid:—

First time	1·100
Second time	1·006
2)	2·106
Average	1·053 in 1,000 volumes.

Sixth Experiment.

Stable of E Battery, separate building, for 30 horses. Cubic space nearly 1,000 feet per horse.

Ventilation:—420 air bricks; 25 windows; 2 doors; ridge opening.

Carbonic acid:—First time, ·900 in 1,000 volumes. In this case a horse breathed over the jar as it was being filled, so that the determination cannot be depended upon.

Second time, ·593 in 1,000 volumes.

Temperature outside:—Dry, 54°; wet, 53°. Dew point, 52°.

Humidity, ·93.

Temperature in stable:—Dry, 56°; wet, 55°. Dew point, 54°·1.

Humidity, 93.

From the above observations it will be evident that the ventilation in the isolated buildings, both barracks and stables, was better than where the sleeping-room of the men was over the stable. At the same time it must be admitted that the inlet and outlet area in the latter case was radically deficient, being less than in the isolated huts.

Experiments were also made at the hospital, the ventilation of which was found satisfactory. These formed the subject matter of a separate report.

Netley, December 2nd, 1865.

REPORT ON THE VENTILATION OF WARDS IN THE HERBERT HOSPITAL, WOOLWICH.

By Staff Surgeon F. De Chaumont, M.D.

The wards selected for examination were two, viz., one on the ground-floor of A Pavilion, and one on the upper floor of B Pavilion.

Dimensions.—Length, 119 feet; breadth, 26 feet; height, 14 feet.

Area, 3,094 square feet.

Gross cubic space, 43,316 cubic feet.

Total additions for recesses, &c., 1,668 cubic feet.

Total deductions for men, furniture, &c., 629 cubic feet.

Net addition, 1,039 cubic feet.

Total net cubic space, 44,355 cubic feet.

Cubic Space per Man.—This gives, with 32 patients (the authorised number)—of area, 96 square feet; of cubic space, 1,386 cubic feet.

The actual number in the ward was 30, which made the net cubic space equal to 44,363 cubic feet.

This gave, per man, of area, 103 square feet; of cubic space, 1,479 cubic feet.

Means of Ventilation:—

The arrangements for ventilation are,—

I. *Natural.*—One folding door (swinging), with movable window above; one large window at opposite end of ward; sixteen opposite windows in sides of ward; two chimneys of stoves.

II. *Artificial.*—Eighteen air-bricks, 8″ × 2¼″, opening into ward by Sheringham valves, each, when open, measuring 7½″ × 3½″;* four air-bricks, 12″ × 12″, communicating with ward by grating round stove, which has an area of 2·2 square feet for each stove;† four louvres (War Office pattern) at the four corners of the ward, each 1′ 1″ × 8″, communicating with extraction shafts; four outlet tubes round gas-tubes.

There is also a perforated oak skirting round the floor, to allow air to circulate under the boards.

* In estimating the outlet and inlet area, the first measurement is taken; in estimating the movement of air, the second measurement, as the rate was determined at the opening into the ward.

† The area of the bricks is taken in estimating the outlet and inlet area, and of the stove in estimating the movement.

The means of warming are two stoves, which warm the air brought in through the *large* ventilating bricks and distributed from the grating round the stove.

There is also a hot-air coil to the lavatory and water-closet.

Experiment.—At 10·50 P.M., November 23rd, 1865, there were thirty patients in bed; a moderate fire in both stoves.

All the ventilators (which appear to have been generally kept shut) were opened, and kept so during the night.

The following ventilators were acting:—

Inlets:—Nine Sheringham valves on the east side, total area, 54 square inches;* two stove gratings, connected with bricks, whose area is 192 square inches (⅓ as above).

Total inlet area, 246 square inches.

Outlets:—Nine Sheringham valves in west side, total area, 54 square inches; four louvres connected with extraction shaft, total area, 139 square inches (⅓ of gross area); four gas-tubes (estimated), 12 square inches; two chimneys, 288 square inches.

Total outlet area, 493 square inches.

Total inlet and outlet area, 739 square inches.

This gave, per man, for 32 patients, 23·1 square inches; for 30 patients, 24·6 square inches.

The rates of movement of air were,—

Inlets:—Nine Sheringham valves, rate, 191·4 linear feet per minute, delivering 16,078 cubic feet per hour; one stove grating, rate 81·6 linear feet per minute, delivering 5,382 cubic feet per hour, at a temperature of 78° F.; one stove grating, rate 91 linear feet per minute, delivering 6,106 cubic feet per hour, at a temperature of 85° F.

Total cold air, 16,078 cubic feet; total warm air, 11,488 cubic feet, average temperature, 81°·7 F.

Total delivery per hour, 27,566 cubic feet.

Outlets:—Nine Sheringham valves, rate 132 linear feet per minute, discharging 11,088 cubic feet per hour; one louvre (south-east), rate 45 feet per minute, discharging 764 cubic feet per hour; one louvre (south-west) *not acting;* one louvre (north-west), rate 292·6 feet per minute, discharging 4,368 cubic feet per hour; one louvre (north-east), rate 403 feet per minute, discharging 6,843 cubic feet per hour.

Outlet tubes round gas-pipe not measurable.

Two flues of stoves, not measurable, it being impossible to get the instrument in.

Say, for the two, 10,000 cubic feet per hour.

Total discharge, 33,063 cubic feet per hour.

These numbers give, per man per hour, for 32 patients, 861 cubic feet of delivery, and 1,033 cubic feet of discharge. For 30 patients, 919 cubic feet of delivery, and 1,102 cubic feet of discharge.

This was, of course, independent of what found its way in and out through the natural ventilators, *i.e.*, windows and doors, and which, of course, did not admit of measurement.

At 9 P.M., November 23rd, the barometer stood at 29°·1 inches, and there was a slight breeze. The following observations were made in the ward:-

Dry bulb, 64° F.; wet ditto, 61°. Dew point, 58° 5.

Elastic force of vapour (inches of mercury), ·492.

Weight of vapour in a cubic foot of air, 5·4 grains.

Vapour required to saturate a cubic foot of air, 1·2 grain.

Humidity (saturation = 100), 82.

The carbonic acid was determined by Pettenkoffer's method, and gave,

First time	·593	in 1,000 volumes
Second time	·603	„
	2)1·196	
Average	·598	„

* This is one-third of the gross area of the bricks, the other two-thirds being deducted for the solid non-perforated portions and for friction.

The normal amount in the open air being ·400 in 1,000 volumes.
At 11 P.M., same night,—
Dry bulb, 63°; wet ditto, 59°·5. Dew point, 56°·5.
Elastic force of vapour, ·448.
Weight of vapour in a cubic foot of air, 5 grains.
Weight of vapour required to saturate a cubic foot of air, 1·4 grain.
Humidity, 79.

The carbonic acid gave—

First time	·527	in 1,000 volumes
Second time	·489	„
	2)1·016	
Average	·508	„

At 1 A.M., November 24th, the movement of air was again determined.
Inlets:—Nine Sheringham valves, rate 136 feet per minute, delivering 11,424 cubic feet per hour; two stove gratings, rate 68 feet per minute, temperature, 88° F., delivering 8,976 cubic feet per hour.
Total delivery, 20,400 cubic feet per hour.
Outlets:—Nine Sheringham valves, rate 293 feet per minute, discharging 24,612 cubic feet per hour; four louvres, rate 128 feet per minute, discharging 8,694 cubic feet per hour; two chimneys—say 10,000 cubic feet per hour.
Total discharge, 43,306 cubic feet per hour.
These numbers gave, per man per hour, for 32 patients, ·638 cubic feet of delivery, and 1,356 cubic feet of discharge. For 30 patients, ·680 cubic feet of delivery, and 1,443 cubic feet of discharge.
The barometer had fallen to 29·03, and the wind had freshened to a gale.
In the ward,—
Dry bulb, 59°; wet ditto, 54°; dew point, 49°·5.
Elastic force of vapour, ·354.
Weight of vapour in a cubic foot of air, 4 grains.
Weight of vapour required to saturate a cubic foot of air, 1·6 grain.
Humidity, 71.

The carbonic acid gave,—

First time	·518	in 1,000 volumes
Second time	·496	„
	2)1·014	
Average	·507	„

At 3 A.M. same morning, the movement of air was again determined, and gave the following results:—
Inlets:—Nine Sheringham valves, rate 233 feet per minute, delivering 19,572 cubic feet per hour; two stove gratings, delivering 5,192 cubic feet per hour.
Total delivery, 24,764 cubic feet per hour.
Outlets:—Nine Sheringham valves, rate 242 feet per minute, discharging 20,328 cubic feet per hour; four louvres, rate 196 feet per minute, discharging 13,212 cubic feet per hour; two chimneys—say 10,000 cubic feet per hour.
Total discharge, 43,540 cubic feet per hour.
This gave, per man per hour, for 32 patients, 774 cubic feet of delivery, and 1,361 cubic feet of discharge. For 30 men, 826 cubic feet of delivery, and 1,451 cubic feet of discharge.
The barometer remained at 29·02, the gale continued, and it was raining.
In the ward,—
Dry bulb, 58°; wet ditto, 56°; dew point, 54°·2.
Elastic force of vapour, ·421.
Weight of vapour in a cubic foot of air, 4·7 grains.
Weight of vapour required to saturate a cubic foot of air, ·7 grains.
Humidity, ·87.

The carbonic acid gave,—

First time	·590	in 1,000 volumes
Second time	·572	„
	2)1·162	
Average	·581	„

At 4 A.M. same morning, the gale continued, as also the rain.
In ward,—
Dry bulb, 59°; wet ditto, 56°; dew point, 53·3°
Elastic force of vapour, ·407.
Weight of vapour in a cubic foot of air, 4·6 grains.
Weight of vapour required to saturate a cubic foot of air, 1 grain.
Humidity, 82.
The carbonic acid gave,—

First time	·583	in 1,000 volumes
Second time	·540	„
	2)1·123	
Average	·562	„

At 5 A.M., same morning, weather as before.
In ward,—
Dry bulb, 61°; wet ditto, 56°; dew point, 51°·7.
Elastic force of vapour, ·383.
Weight of vapour in a cubic foot of air, 4·3 grains.
Weight of vapour required to saturate a cubic foot of air, 1·7 grain.
Humidity, 72.
The carbonic acid gave,—

First time	·581	in 1,000 volumes
Second time	·591	„
	2)1·172	
Average	·586	„

At 6.30 A.M. same morning.
In ward,—
Dry bulb, 61°; wet ditto, 57°; dew point, 53°·5.
Elastic force of vapour, ·410.
Weight of vapour in a cubic foot of air, 4·6 grains.
Weight of vapour required to saturate a cubic foot of air, 1·4 grain.
Humidity, 77.
The carbonic acid gave,—

First time	·550	in 1,000 volumes
Second time	·525	„
	2)1·075	
Average	·538	„

These results may be summed up as follows:—
1. The average temperature during the night was 60°·8 F.
2. The average humidity was (saturation = 100), 79.
3. The average carbonic acid (mean of fourteen observations), ·554 in 1,000 volumes.

At 11 A.M. on the 24th instant, the temperature in the ward was 61° F.

The grating of one stove was acting as an inlet, delivering very little; average temperature about 80° F. The grating of the other stove was acting as an outlet, discharging 5,940 cubic feet per hour. This was probably due to the aspirating force of a strong gale outside.

II. The second ward examined was on the upper floor of B Pavilion, also for 32 patients.

The general dimensions are the same, with a slight difference for the absence of a bevelled ceiling.

Net cubic space, 44,534 feet, giving, for 32 patients per man, 1,392 cubic feet.

Net cubic space, with 25 patients (actual number in ward), 44,562 feet; giving, per man, 1,782 cubic feet.

The arrangements for ventilation are the same, except that there are only 14 instead of 18 Sheringham valves.

Total inlet and outlet area per man, for 32 patients, 22·3 square inches; ditto, for 25 patients, 28·5 square inches.

At 10 P.M. on the 23rd November, the movement of air was as follows:—Seven Sheringham valves, rate 214·8 feet per minute, delivering 14,177 cubic feet per hour; two stove gratings, rate 74·2 feet per minute, delivering 8,254 cubic feet per hour.

Total delivery, 22,431 cubic feet per hour.

Outlets:—Seven Sheringham valves, rate 122 feet per minute, discharging 8,052 cubic feet per hour; one louvre (not acting); three louvres, rate 166 feet per minute, discharging 8,456 cubic feet per minute; two chimneys,—say, 8,000 cubic feet per minute.

Total discharge per hour, 24,508 cubic feet.

These gave, per man per hour, for 32 patients, 701 cubic feet of delivery, and 766 cubic feet of discharge. For 25 patients, 897 cubic feet of delivery, and 980 cubic feet of discharge.

This was independent of natural ventilation.

In the ward:—

Dry bulb, 63°; wet ditto, 60°; dew point, 57°·5.

Elastic force of vapour, ·474.

Weight of vapour in a cubic foot of air, 5·2 grains.

Weight of vapour required to saturate a cubic foot of air, 1·2 grain.

Humidity, ·82.

The carbonic acid gave,—

First time	·584	in 1,000 volumes
Second time	·605	„
..	2)1·189	
Average	·600	„

At midnight, 23rd November, the movement of air was again determined.

Inlets:—Seven Sheringham valves, rate 154·6 feet per minute; delivering 10,204 cubic feet per hour; two stove gratings, very feeble, not appreciable by instrument; temperature, 68° F.

Total delivery, 10,204 cubic feet per hour.

Outlets:—Seven Sheringham valves, rate 136 feet per minute, discharging 8,976 cubic feet per hour; four louvres, rate 166 feet per minute, discharging 11,274 cubic feet per hour; two chimneys,—say, 8,000 cubic feet per hour.

Total discharge, 28,250 cubic feet per hour.

These gave, per man per hour, for 32 patients, 319 cubic feet of delivery, and 883 cubic feet of discharge. For 25 patients, 408 cubic feet of delivery, and 1,130 cubic feet of discharge.

The following were the observations in ward:—

Dry bulb, 60° F.; wet ditto, 55°; dew point, 50°·6.

Elastic force of vapour, ·369.

Weight of vapour in a cubic foot of air, 4·1 grains.

Weight of vapour required to saturate a cubic foot of air, 1·7 grain.

Humidity, 71.

The carbonic acid gave,—

First time	·518	in 1,000 volumes
Second time	·540	„
..	2)1·058	
Average	·529	„

At 2 A.M. on the 24th November, in ward,—
Dry bulb, 59°; wet ditto, 55°; dew point, 51°·6.
Barometer, 29·02.
Elastic force of vapour, ·380.
Weight of vapour in a cubic foot of air, 4·3 grains.
Weight of vapour required to saturate a cubic foot of air, 1·3 grain.
Humidity, 76.
The carbonic acid gave,—

First time	·590	in 1,000 volumes
Second time	·527	„
	2)1·117	
Average	·559	„

At 3·30 A.M., same morning, the movement of air was again determined.
Inlets:—Seven Sheringham valves, rate 366·2 feet per minute, delivering 24,169 cubic feet per hour; two stove gratings, not appreciable.
Total delivery, 24,169 cubic feet per hour.
Outlets:—Seven Sheringham valves, rate 403 feet per minute, discharging 26,598 cubic feet per hour; four louvres, rate 108 feet per minute, discharging 7,375 cubic feet per hour; two chimneys,—say 8,000 cubic feet per hour.
Total discharge, 41,973 cubic feet per hour.
This gave, per man per hour, for 32 patients, 755 cubic feet of delivery, and 1,312 feet of discharge. For 25 patients, 967 cubic feet of delivery, and 1,679 cubic feet of discharge.
The observations were, in ward,—
Dry bulb, 59°; wet ditto, 56°; dew point, 53°·3.
Elastic force of vapour, ·407.
Weight of vapour in a cubic foot of air, 4·6 grains.
Weight of vapour required to saturate a cubic foot of air, 1 grain.
Humidity, 82.
The carbonic acid gave,—

First time	·605	in 1,000 volumes
Second time	·633	„
	2)1·238	
Average	·619	„

At 5·30 A.M., same morning, in ward (raining outside),—
Dry bulb, 58°; wet ditto, 57°; dew point, 56°·1.
Elastic force of vapour, ·451.
Weight of vapour in a cubic of air, 5 grains.
Weight of vapour required to saturate a cubic foot of air, ·4 grain.
Humidity, 93.
The carbonic acid gave,—

First time	·741	in 1,000 volumes
Second time	·648	„
	2)1·389	
	·6995	
Average, say	·700	„

These results may thus be summed up,—
1. The average temperature in the ward during the night was 59°·3 F.
2. The average humidity was (saturation = 100), 81.
3. The average carbonic acid (mean of ten observations, normal being ·400) ·601 in 1,000 vols.
In the external air, at 6·10 A.M. on the 24th, the following were the observations:—
Dry bulb, 58°; wet ditto, 56°. Dew point, 56°·2.
Elastic force of vapour, ·421.
Weight of vapour in a cubic foot of air, 4·7 grains.

Weight of vapour required to saturate a cubic foot of air, ·7 grain.
Humidity, 87.
It had been raining.
The carbonic acid gave,—

First time	·417 in 1,000 volumes
Second time	·416 „
	2)·833
	·4165
Average, say	·417 „

At 6 P.M. same day, in external air, during very strong gusts of wind, ·371 in 1,000 volumes. At 6·30 P.M., weather a little calmer, ·416 in 1,000 volumes. Average in external air, ·405 in 1,000 volumes.

In the corridor of A Pavilion, at 5 P.M. 24th November, the carbonic acid gave ·444 in 1,000 volumes.

In the corridor of D Pavilion, same time, ·414 in 1,000 volumes.

Comparing these results together, we have the following, which I have tabulated for convenience.

COMPARATIVE Table of Results.

Locality.	A Lower.	B Upper.	A Corridor.	D Corridor.	External Air.	Remarks.
Authorised number of Patients	32	32	...	...	...	...
Actual number of Patients in Ward ...	30	25	...	...	...	...
Cubic space per Man c. ft.	1,479	1,782	...	...	...	On actual number
Total Inlet and Outlet Area per Man (on actual number) sq. in.	24·6	28·5	...	...	...	In square inches
Total Delivery per Man per Hour (average) cubic feet	808	757	...	...	...	...
Total Discharge „	1,332	1,263	...	...	...	...
Average Temperature ...	60°·8 F.	59°·8 F.	...	...	58° F.	...
Average Humidity ...	79	81	...	...	87	Had been raining
Average amount of Carbonic Acid in 1,000 volumes	·554	·601	444	·414	·405	Normal, ·400

From this Table it will be seen,—

1. That, although the ventilation is on the whole pretty good, the carbonic acid rises a good deal above that of the external air.

2. The total inlet and outlet area is hardly sufficient to provide perfect exchange of air, unless it be supplemented by keeping some of the windows open.

3. That we find, as usual, that it is more difficult to ventilate an upper than a lower room, and that therefore the upper room ought to have more total inlet and outlet area; whereas, in the present case, it was actually less. In B Upper, with five patients less than A Lower, the delivery and discharge of air were less, and the amount of carbonic acid greater, whilst the humidity was also greater, and the temperature lower.

Herbert Hospital, Woolwich, November 25, 1865.

Supplementary Report on the Ventilation of the Wards of the Herbert Hospital at Woolwich.

On the 4th December, 1865, experiments were instituted for the purpose of determining the amount of organic matter in the air of the wards, as compared with the external air. A solution of the permanganate of potash was prepared, containing, in 100 cubic centimetres of water, ·0002 of the salt. To this was added a small portion of strong sulphuric acid, so as to render the determination more delicate.

Through this solution the air of the ward was drawn by means of an aspirator for three hours and a-half, from 7·45 to 11·15 P.M., the amount of air being 15 cubic feet. The colour of the solution was completely discharged. There were 28 patients in the ward, and two orderlies tending the apparatus.*

During the same time a similar experiment was carried on in the open air, between the pavilions, 16 cubic feet being drawn through. In this case, also, the colour was completely discharged.

Another solution was prepared, containing ·0005 of permanganate, and through this 11 cubic feet of the ward air (from 11·45 P.M. to 1·45 A.M.) were drawn.†

At the end of the time the colour of the solution was greatly diminished, but was still perceptible. During the same time, 10 cubic feet of the external air were drawn through a similar solution. At the conclusion of the experiment, the colour of the solution was found to be diminished, but to a much less degree than in the case of the ward. It may therefore be stated that the ward air contained a very small excess of organic matter over the external air.

The plan followed in this case is a slight modification of that usually followed (and which was employed at Hilsea), and is, I think, more delicate in its operation.

Royal Victoria Hospital, Netley, December 6, 1865.

* Three of the Sheringham valves were shut, and two were closed and could not be opened.

† The three Sheringham valves were opened at 11·15. The two others were closed and would not open.

REPORT

OF THE

MEDICAL BRANCH FOR 1864.

BY

THOS. CRAWFORD, M.D.,

STAFF SURGEON,

HEAD OF THE MEDICAL BRANCH.

TO THE DIRECTOR-GENERAL

OF THE

ARMY MEDICAL DEPARTMENT.

SIR,

I HAVE the honour to submit the Report of the Medical Branch of the Army Medical Department for the year 1864.

Officers of the Department.

On the 1st of January there were 1,039 Officers on full-pay, 1 Officer was brought in from half-pay, and 117 gentlemen were commissioned as Assistant-Surgeons during the year.

There were during the same period 21 deaths, including one killed in action, 10 resignations, 7 retirements on permanent and 10 on temporary half-pay, and the services of 2 officers were dispensed with, so that on the 31st of December, 1864, the number of Medical Officers on full-pay was 1,107.

There were 24 acting Assistant-Surgeons appointed during the year, viz., 13 in July and 11 in August. These appointments, being temporary, are not included in the permanent Medical Staff of the Army.

Medical and Surgical Transactions.

A number of interesting contributions to the records of Military Medicine and Surgery will be found in the following pages. It has not been deemed necessary to limit the selection of papers for this section of the report to the official year to which this volume chronologically belongs. The articles are either purely professional or of such a character as to render their early publication desirable, and having no direct reference to the statistics of disease in the Army it has not been considered necessary to delay their publication in order that they might appear in the volume for the year in which they were received.

Army Medical School.

Under this head will be found the reports of the ninth, tenth, and eleventh sessions of the school, with lists of the candidates for the British and Indian Medical services, arranged in the order of merit as determined by the results of the examinations.

Circulars, &c.

The circulars issued between the 1st of April, 1865 and 30th of June, 1866, and having reference to the Medical Department, will be found at page 577 and following pages. It is not necessary to republish the clauses of the royal warrant of 3rd February, 1866, which refer to Medical Officers, because that warrant forms Volume I. of the revised Army Regulations, which can be procured from any of Her Majesty's stationers, and ought to be in the possession of every Officer.

A nominal list of Medical Officers on full pay, corrected to 30th June, 1866, closes the report.

I have the honour to be,

Sir,

Your most obedient humble servant,

THOS. CRAWFORD, M.D., *Staff Surgeon,*

Head of Medical Branch.

Army Medical Department,

6, *Whitehall Yard, August 15th,* 1866.

MEDICAL REPORTS FOR 1864.

REMARKS ON THE CESTOID, OR TAPE-LIKE WORMS,

With especial reference to the Tænia Echinococcus, and its larval condition—the so-called Hydatid Cyst.

By PETER DAVIDSON, Esq., M.D., Staff Surgeon and Assistant Professor of Pathology at the Army Medical School, Netley.

IT is curious to notice the extraordinary impetus which of late years has been given to the study of animal parasites, as also to remark how greatly our knowledge of their general history has extended in a comparatively short space of time. Apart from the great importance attaching itself to a consideration of these animals, as causes of disease or disability among soldiers, and viewed simply as a department of natural history, the subject is one which attracts no ordinary share of attention, involving as it does, not only the knowledge of an endless assortment of creatures of the most peculiar forms and habits, but also some of the most interesting questions in connection with the generation and reproduction of organic beings. To no portion of this great family of creatures do these remarks more forcibly refer than to the *Cestoid* group of the entozoa, which includes the banded, riband-like, or tape-like worms.

Since the period when the conclusive practical researches of Küchenmeister, in connection with the development of individual tapeworms, furnished the key by which our present knowledge of the group generally has been elucidated, a new era in connection with the study of this important branch of helminthology has been initiated; and so extensive is the distribution of this group of parasites among the animal kingdom and in all parts of the world, that a wide field of enquiry has been opened up, and is day by day extending. These experiments of Küchenmeister were undertaken in the year 1851, with a view to the practical solution of certain questions involved in the theories of Steenstrup, Dugardin, Von Siebold, and Van Beneden, relative to the development of these worms; and it may be said that such a comparatively simple elucidation of problems, for centuries involved in obscurity, elicited no small measure of surprise. The experiments were as follows: he administered to a dog some cysticerci from a rabbit (*cysticercus pisiformis*), and to a cat, some similar encysted worms (*cysticercus fasciolaris*), from a rat, and in both instances he reared tapeworms in the intestines of these animals; proving, at least in these two instances, the individuality and successive development of the encysted worm or *Cysticercus*, and the tapeworm.

As further observations in this direction accumulated, and a knowledge of the complete cycle of life history of the cestoid worm was attained, it was difficult for those hardly familiar with the subject in its individuality to realize the fact, that this was capable of resolving itself into certain main features, which with some modifications might not inaptly be compared with the transformations of an insect; and that the various phases of development of an insect, viz., the egg, the larva or pupa, and the perfect insect, were in a measure individually the counterparts of the egg, the larva, *Cysticercus* or hydatid,

and the mature tapeworm—with this difference, however, that in the intermediate stage of its existence as a larva, the cestoid parasite has in certain instances been endowed with the faculty of developing a large number of creatures similar to itself by a process of gemmation or budding, and these individually capable, when placed in favourable situations, of emerging into mature worms. Of these phenomena in reproduction it may be remarked, that we have numerous analogues, both in the animal and vegetable kingdom.

The limits of these remarks do not admit of a more extended reference to the gradual development of our present knowledge of these parasites. For full information on this interesting subject, as also on all details in connection with the general and individual history of the group, the reader is referred to the works of Küchenmeister, Von Siebold, and Leuckart; to the systematic resumé of our present information respecting them in the "Science and Practice of Medicine," by Professor Aitken, of the Army Medical School; as also to the comprehensive work of Dr. Cobbold, on "Entozoa," lately published, and Dr. Thudicum's excellent remarks on "Parasitic Diseases of Animals," in the Seventh Report of the Medical Officer of the Privy Council.

The following facts in connection with the development and propagation of parasites, having now been ascertained and demonstrated, may be given in a summary form:—

Cestoid Parasites in their development from the early ovum to the condition of the perfect worm, pass through a series of progressive phases of development, the chief phenomena of which may be considered as resolving themselves into certain prominent stages, embracing periods of mature and immature existence.

For the due maintenance of this extended life period, and their consequent perfect development, a series of migrations through the bodies of three animals is requisite.

Each species of parasite has its own definite series of animals (hosts), in which it finds conditions appropriate to its mature and immature periods of existence respectively.

In the mature condition they are free, living in the intestines and open cavities of animals; and in the immature larval condition they are encysted, inhabiting the parenchymatous organs and closed cavities.

With the exception of reptiles, in which their occurrence is rare, they are abundantly distributed throughout the vertebrate kingdom.

The Tapeworm is the mature form of the cestoid parasite, and as such free and sexually perfect; in its nature it is a compound animal, or associated colony of joints or segments, each of which is a sexually mature hermaphrodite individual, furnished with male and female organs of generation, and capable of producing in its interior fecundated ova.

In this condition it constitutes the ultimate transformation of the parasite from the intermediate form or larva introduced from without.

This transformation can only be completed in a suitable vertebrate animal or *host*, and only in the intestine of that host.

In this condition it is known as a *Strobila* (Van Beneden), and its individual segments as *proglottides*.

The Larva, Cysticercus or Hydatid is the immature form of the cestoid worm; as such encysted and asexual, and constitutes an intermediate preparatory stage of a tapeworm.

In this condition, it represents the result of certain progressive stages of development of the embryo of a tapeworm, introduced into the animal from without; and although in its nature asexual, in certain instances it is capable of multiplying itself indefinitely (*Echinococcus and Cœnurus*), by a process of gemmation or budding.

This larval condition can only be attained in a suitable animal, and only in the parenchymatous organs or closed cavities of such an animal.

Each species of tapeworm has its own definite *Cysticercus* or larva;—known as a *scolex* or nurse.

The Ovum of Cestoid Parasite is produced in the interior of the full-grown segments of the worm which have undergone impregnation, and when perfect, consists of a strong egg capsule, containing an embryo, furnished in most of the group, with a boring apparatus of six hooklets.

Fig. 1. Head and neck tænia solium,

Fig. 2. Head and neck of tænia mediocanellata,

Showing differences in the formation of the heads of the human tæniæ. (Thudicum.)

Fig. 3. A measle from pork; head and vermicular part protruded from the bladder. Magnified. (Thudicum.)

Fig. 4. Tænia ecchinococcus. Magnified 24 times. (Thudicum.)

Fig. 5. Ecchinococcus cyst. (Thudicum.)

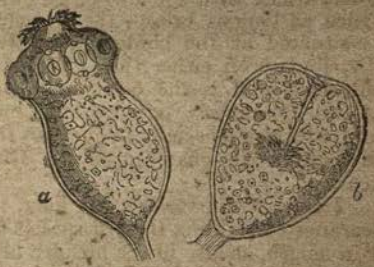


Fig. 6. Ecchinococci from the internal surface of the cyst. Magnified. (Thudicum.)

Fig. 7. Section and inner granular surface of the wall of the Ecchinococcus cyst, showing the layers. (Thudicum.)

Migrating from the intestine of its host, with or without its containing proglottid, the ovum is capable, under favourable conditions, of realizing for some time in the outer world an independent existence, disseminating itself among the grass, ground fruit, vegetables, or water.

If again introduced into the body of another animal, and this animal suitable, the embryo (escaping from the ovum) pierces its way into the tissues, where it undergoes the larval stages of its development.

In the free condition of the embryo, it is known as a *proscolex*.

Reviewing these general facts therefore, it may shortly be said that the complete cycle of life of the cestoid parasite resolves itself into the following sequence of events :—

A vertebrate animal harbours in its intestine a sexually mature and perfect tapeworm. The ova of this worm pass to the outer world, and are disseminated among grass, fruits, vegetables or water. By means of some of these agents, as material for food or drink, they are introduced to the intestine of a second animal, and here escaping from their strong investing egg capsule, the embryos, by means of their boring apparatus, pierce their way to the parenchymatous organs, and become encysted, passing through those intermediate preparatory stages of growth, during which they are known as *Cysticerci* or hydatids. Finally, by means of animal food containing them, these larval forms reach the intestine of the third animal, where the ultimate change or transformation into the tapeworm takes place.

The members of the tapeworm group, at present known to infest the human body either as mature or encysted worms, are ten in number; and the following short resumé of their chief individual peculiarities may be of interest.

Tænia Solium.—A long numerously jointed worm, 8 to 10, sometimes 30 feet in length; head (Fig. 1) globular with four suckers, and a conical proboscis armed with a double circle of hooks. The mature segments are about twice as long as broad; the reproductive papilla in each of these segments is situated at the border, generally below the central line, but irregularly distributed on either side. This worm is especially frequent in the human intestine, and is the common tapeworm of this country. Its larval condition is the *Cysticercus cellulosæ*, the measle or bladder-worm of pigs (Fig. 3.), and which is especially frequent in the muscles of the pig, but not unfrequently in man, in the chambers of the eye, cellular tissue, brain, and muscles of the heart.

Tænia Mediocanellata.—A long, numerously-jointed worm, in general appearance resembling the last species, but is fatter-looking and generally exceeds it in length, as also in the breadth of its segments. The head, however, differs considerably (Fig. 2), being flat, and abruptly truncated with four large and powerful sucking discs, but destitute both of proboscis and hooks. It is of common occurrence in certain localities, as Russia, Denmark, the Cape of Good Hope, and the East Indies.* Its larval condition is the *Cysticercus Tæniæ Mediocanellatæ*, the measle or bladder-worm of cattle. As yet it is only known to occur in the muscles and internal organs of bovine animals.

Tænia Elliptica.—Is a short and delicate-looking worm, from 6 to 8 inches in length. Its segments have a reproductive papilla in each free margin. It is pretty common in cats and dogs, but is rare in man. Its larval condition is unknown.

Tænia Nana.—A small worm only about 8 to 10 lines in length, and very numerously jointed. The head is furnished with an armature of bifid hooks. It is rare in man, and its larval condition is not known.

Tænia Flavopuncta.—Is a short worm, about 8 to 12 inches in length. It is very rare in man, and its larval condition is unknown.

Tænia Echinococcus.—Is an exceedingly small worm (Fig. 4.), generally less than half-an-inch in length, and of not more than three or four segments. It is chiefly abundant in the intestine of dogs and wolves, but has not been found in man. Its larval condition is the *Echinococcus* hydatid, the *Cysticercus*

* Dr. Adams, Surgeon, 1st Battalion 22nd Regiment (Army Medical Reports, 1863), mentions that most of the tapeworms he met with in India belonged to this species, and during last year two worms of this species were obtained at Netley from invalids from India, and in both instances the men had served in India for several years previously.

Tæniæ Echinococcus, or many-headed bladderworm of cattle. It is chiefly abundant in the tissues of man, oxen, sheep, and numerous other herb-eating animals. This parasite will be more fully described.

Tænia Marginata.—Is a long worm, in general appearance rather resembling the *Tænia Solium*, but it is smaller and more delicate looking. It inhabits dogs and wolves, but is unknown in man. Its larval condition is the *Cysticercus tenuicollis*, the diving bladder-worm or *water bladder* of butchers. It occurs very abundantly in sheep, less so in oxen and pigs, and is usually found in the peritoneal cavity. Only one or two isolated instances are known of its occurrence in man.

Tænia Acanthatrios.—The larval condition of this worm alone is known. It has been found in a single instance only, in America, in the muscles of a woman.

Bothriocephalus Latus.—This worm is the *Tænia lata* of Linneus. It is a very large, strong worm; in length averaging from 6 to 20 feet. The head is elongated and compressed, with two longitudinal furrows or depressions. It has no hooks. The segments at some points are nearly an inch in breadth, and each is furnished with two reproductive orifices, situated close together on one of the flat surfaces, nearer its upper than its under margin. It is of rather frequent occurrence in man in some localities, chiefly along the coasts of North Europe, especially Lapland and Finland. Its larval condition has not yet been discovered, but it is supposed to reside in fish.

Bothriocephalus Cordatus.—Is a short worm about a foot in length, which has only lately been described by Leuckart. The head is heart-shaped and without hooks. At present it is only known to occur in Greenland. One specimen was obtained from a man and several from dogs. Its larval condition is unknown.

Concerning these parasites it may be remarked that according to our present knowledge, only one, the *T. solium*, finds in man a resting place, suitable for the development both of its mature and larval stages. The *T. mediocanellata*, *T. elliptica*, *T. nana*, *T. flavopuncta*, and the two species of *Bothriocephalus* infest him only in the mature strobila condition; and with the exception of the *T. mediocanellata and Bothriocephalus latus*, the others are so rare in their occurrence as to render them mere curiosities. The *T. echinococcus*, *T. marginata*, and *T. acanthotrias*, on the other hand, find man an appropriate host only during their larval or intermediate condition, and the two latter so very rarely, as to attract no interest as causes of disease.

With regard to the *Tænia echinococcus*, it is very different. A small and insignificant worm, infesting chiefly the intestines of dogs, it is difficult to realize the serious consequences resulting from the wanderings of its progeny when introduced into man. The embryo of this worm finds in man the conditions appropriate to its larval development; few of his tissues are exempt from its inroads; important organs too frequently afford it a resting place; and endowed with wonderful powers of reproduction, it quickly encroaches on the vital functions and integrity of the part, always producing most serious disease and in many cases a fatal result.

Accumulating evidences of the dissemination of "hydatid disease" among soldiers, lead us to the belief that in some stations of the British Army the conditions favourable to its propagation somewhat frequently occur; and this consideration is rendered doubly important by the knowledge we now possess of the disastrous consequences resulting from "hydatid disease" when it assumes, as it does in Iceland and Denmark, an endemic character. In the succeeding remarks it is proposed to consider shortly and chiefly from a pathological point of view, the development and propagation of this dangerous parasite, its geographical distribution, and lastly the prophylactic measures likely to prevent its dissemination.

The Tænia Echinococcus.

Is an exceedingly small worm, usually less than half-an-inch in length, and of not more than four segments, the last of which is always the largest, and constitutes when mature fully half the length of the parasite (Fig. 4). The head is rounded, with four lateral equidistant suckers, and

terminates anteriorly in a small proboscis, armed with a double crown of hooks. The reproductive papilla is situated at the margin of the segments, slightly below the central line, and is generally only visible in the last two segments. The intromittent organ is rather conspicuous, and not unusually protruded. In the interior of the full-grown last joint the eggs are produced, these eggs developing in their interior the usual six-hooked embryos. This peculiar little worm is chiefly abundant in dogs, more especially butcher's and sheep dogs in certain localities. It also occurs in the wolf, and probably also in the fox and jackal. It has been bred by the experimental method in dogs from ecchinococcus heads, by Küchenmeister, Haubner, and Leuckart; and from the experience of these observers, it appears to require a period from seven to nine weeks for its development. The especial haunt of the worm in the dog is the duodenum and upper part of the small intestine, lying in numbers embedded in the mucus, with their heads attached to the villous surface of the mucous membrane. The milk-white appearance of their joints betrays their presence, but they may easily be overlooked, especially if they happen to be only incompletely developed (Cobbold).

Larval Condition of the T. Echinococcus, or Echinococcus Hydatid.

Insignificant as the mature *T. Echinococcus* may appear in itself, it is certainly by far the most formidable member of the cestoid group, it being now satisfactorily ascertained that those peculiar formations known as "hydatid cysts," or, "acephalo cysts," and which are so frequently the source of the most serious consequences to life, are simply the result of the development of the immature or larval state of this worm. Unlike the mature parasite, which as far as we at present know, is only found in the intestinal canal of a few carnivorous animals, the larva has a much more extended sphere of growth, inhabiting the tissues of a great variety of animals, chiefly those in which vegetables or green food enter more or less into their food. Among these may be enumerated man, sheep, oxen and cows, deer, pigs, monkeys, and camels, also the horse, the ass, and the zebra. Of these, man, sheep, oxen and cows, would appear to be the most frequent bearers of the parasite. Of its abundant distribution among the human species, the history of the Iceland epidemics of hydatid disease, our current professional literature, and the numerous pathological collections in this and other countries bear sad and ample evidence. Among our soldiers, as in civil life, it is difficult to obtain a correct estimate of its actual prevalence, for on account of the frequent and peculiar latency of the disease, and its numerous spontaneous cures, a large number of cases must naturally escape our observation. There are good grounds, however, for supposing that at some of our military stations, to which more particular reference will subsequently be made, the conditions rather frequently exist for the dissemination of the disease. In sheep its abundant distribution may be judged of by the fact, that, Dr. Thudicum found, on instituting an enquiry some years ago, into the frequency with which *Echinococcus* hydatids occur in these animals, in London, that among the worst classes of sheep sold in Camden Town, he sometimes could not find a single animal entirely free from them. In oxen and pigs in this country, according to the same authority, they are comparatively rare, but good grounds exist for supposing that in some other countries, as far as oxen are concerned, their occurrence in them is frequent. It is well to bear in mind, as Dr. Thudicum also points out, that their prevalence in these animals is liable to be influenced by the age of the animal, season of the year, and certain atmospheric conditions. For instance, sheep are born in spring, and are most easily infected with parasites during the first year, in subsequent years much less so. Infection with eggs of *Tænia* also probably occurs with greater facility in spring than in summer, and in wet seasons much more frequently than in dry.

It was supposed by Küchenmeister, Weinland, and others, that two distinct forms of echinococcus larvæ existed, referable individually to two species of tapeworms, and to these larvæ Küchenmeister applied the designations of *E. scoliciparíens* and *altriciparíens*. Leuckart, however, has satisfactorily shown that the individual variations which had led to such a belief were not specific but merely degrees of development, and it is now generally understood

that there is only one form of echinococcus larva, the progeny of the single species of worm just described.

The growth of the hydatid cyst takes place in the following manner:—The ovum of the *T. Echinococcus* having been introduced into the intestine of a suitable host, the embryo, released from its covering, finds its way to some point or organ suitable as a nidus for its future development. Here, in its earlier stages, it consists of a simple, spherical, opalescent-looking vesicle, inclosed in a capsule of connective tissue. The wall of this vesicle is composed of a peculiar structureless laminated membrane (*ectocyst*. Huxley), rather granular in its inner aspect. Spread over this inner surface is an exceedingly delicate internal membrane (*endocyst* or mother sac), and on it after the lapse of some time, the peculiar embryonic vesicles known as *Echinococci* (Fig. 6) develope themselves. These *echinococci* appear as delicate white points or particles, scattered singly or in clusters on the inner membrane, or floating free in the fluid contained in the cyst. When examined with a magnifying power of about 300 diameters, they are seen to be delicate vesicles furnished with a neck and head and four suckers (Fig 6A), the head armed with a variable number of hooklets, and generally retracted within the vesicle, in which case the festoon of hooks appear about its centre (Fig 6B). It must be borne in mind that these echinococcus heads, though individually capable of transformation to the perfect state, are like the *cœnuri*, merely integral portions of a compound larva, represented by the mother sac and its contents. In this respect the cysts of these parasites are to be distinguished from that of the cysticercus cellulosa, for example, which is a single-headed individual (Fig 3).

In so far as the growth of the primary vesicle is concerned, echinococcus cysts would seem to correspond in all cases; and although in future stages the main developmental phenomena may probably also prove alike in all, certain variations in the form and general appearance of the cysts occur. In some instances, they form as simple isolated cysts, or aggregated clusters of cysts. This, the exogenous variety, is that chiefly met with in the lower animals, but it also occasionally occurs in the human subject. Under certain conditions of growth, this simple cyst bears considerable outward resemblance to that of the cysticercus cellulosa, but is readily distinguished from it by the character of the cyst wall and contents. In the next or endogenous form, the parent cyst contains numerous young cysts in its interior, of all sizes, from a pin's head to that of a small orange, the larger of these containing a similar progeny of vesicles, and these again occasionally others of a fourth generation. This is the form in which it usually occurs in the human body, and is undoubtedly the most dangerous to life; for although the fertility of the cyst in many instances is comparatively small, in others the reproductive power is so great, and the multiplication of the contained vesicles so prolific and continuous, that most formidable tumours are frequently the result. The third and last form is that described as the multilocular cyst. In this variety, the tumour is made up of a number of alveolar interspaces in the substance of the organ, varying in size from a millet seed to that of a pea, or larger. These alveoli are round, elongated, or irregular in shape, and contain delicate lamellated cysts in their interior. This form is rare, and as yet has only been found in man. Buhl, Luschka, Zellar, and Virchow have recorded cases all in the liver. A preparation No. $\frac{\text{R } 1626.}{\text{App. } 368.}$ in the pathological collection at *Netley*, would appear to be an example of this variety of the tumour. It is a portion of the human liver, on the surface of which there is in the first place an echinococcus cyst of the ordinary endogenous form, and at a short distance from this cyst, a section through the preparation, exhibits a multilocular tumour. I have failed to discover in the alveoli remains of ecchinococci, but the delicate cysts contained in them were found to be made up of two or three fine layers, here and there interspersed with calcareous needle-like bodies. Virchow considers the delicate stratified cyst wall a sufficiently distinctive character of the echinococcus cyst.

The sac or capsule enveloping the echinococcus cyst, is formed mainly of connective tissue, and is developed about the parasite in the same way as fibrous capsules generally form round foreign bodies introduced into the tissues.

In the early stages it is comparatively thin, but as growth advances it attains considerable thickness and density. The true cyst of the parasite is peculiar and characteristic (Fig 5). It is a whitish, gelatinous-like spherical bladder, occasionally translucent, more frequently when of any standing, semi-opaque or opaque. This vesicle, when entire, has a peculiar tremulous appearance, like that of firm jelly, and when broken, by reason of the elasticity of its walls, never collapses entirely, like the vesicle of the cysticercus cellulosa, but has a tendency to roll on itself. The cyst wall is composed of numerous concentric layers, giving in section under a tolerably high power, the laminated appearance seen in Fig 7, and which serves to distinguish this cyst from those of the other vesicular worms. The cyst wall contains in its substance a number of clear calcareous spherules and particles, which are most abundant in the older cysts. The contained fluid is peculiar. It is usually colourless, slightly opalescent, of low specific gravity, 1007–1010, and with a neutral or slightly alkaline reaction. It does not coagulate with heat or nitric acid, containing no albumen; but being strongly impregnated with chloride of sodium, gives a copious precipitate with solution of nitrate of silver. A few drops evaporated slowly on a glass, show under the microscope abundant crystals of chloride of odium.

Such may be said to be, so far, the normal features of the *Echinococcus* cyst and its contents; but it must be borne in mind, that from advancing age of the parasite, obstruction, or termination of its vitality, &c., certain retrograde changes often take place in the tumour, considerably altering the general appearances described. The enveloping capsule, in tumours of some standing, attains considerable thickness and a density almost cartilaginous, and is likewise liable to undergo certain forms of degeneration. The interior of the sac assumes a rough, puckered, cicatricial-like appearance, showing here and there, both on the surface and in its substance, soft yellowish degenerating masses, which Dr. Budd remarks,* are very like the yellow spots seen on the interior of arteries. This soft degeneration of the investing capsule is often the cause of its rupture. In another respect, degeneration of the hydatid capsule, would seem to resemble the degeneration of vessels, for in numerous instances, calcareous changes take place in the sac, and earthy plates and masses form in its substance, not unfrequently to such an extent as to convert it into a complete calcareous shell. When the capsule from such causes becomes rigid, it contracts and compresses the hydatids, often leading, as Cruveilhier pointed out, to a spontaneous cure. These forms of degeneration taking place in the enveloping capsule, may probably result from changes in the connective tissue corpuscles, analogous to those which take place in atheromatous lesions of the aorta, as I have attempted to show (Army Medical Reports, 1863). In some cases, between the capsule and the hydatid cyst, a soft greyish mass, sometimes thick and tenacious, sometimes fluid and pus-like, forms, compressing and destroying the vesicles. This material consists mainly of oily globules and granules, with a few crystals of cholesterine. In a large proportion of cases, hydatid cysts of the liver are destroyed in this way, and become in consequence harmless (Frerichs). In some instances, in consequence of the entrance of bile, or of inflammatory action, the cyst shrivels, and the growth of the parasite is arrested. In some cases, probably from diminished vitality, the parent cyst becomes abortive, and though in itself comparatively normal in appearance, contains no living echinococci. Such is the nature of the cysts to which the term of "Acephalo cyst" is now restricted.

There are few of the tissues of the human body in which *Echinococcus* hydatids have not been found. Considerable trouble has been taken by several observers, especially Rokitansky, Davaine, and Cobbold, to supply statistics as to the localities of these hydatids in man. The two latter authors have given analyses of over 500 cases, collected from various sources, more than the half of which occurred in the liver; the organs next in frequency affected being in the following order, viz., the lungs, brain and spinal chord, kidneys and bladder, pelvis, bones, &c. In the Pathological Collection of the Army Medical Department at Netley there are 23 preparations of *Echinococcus* cysts. Of these, 15 had their seat in the liver, 2 in the brain, 2 in the kidney, 1 in the costal pleura, 1 in the lung, 1 was passed by the bowel, and 1 by the urethra.

* "Diseases of the Liver," p. 423.

Propagation of the T. Echinococcus.

Viewing conjointly the knowledge which has been acquired in modern times of the genetic history of this parasite, the different classes of animals in which its mature and larval conditions respectively are found, and the various circumstances brought to light in connection with the development of epidemics of hydatid disease in certain localities, we are warranted in concluding that this disease owes its more immediate dissemination, for the most part, to dogs, perhaps occasionally to foxes, wolves, and jackals, in districts where they abound. It can easily be understood, that in those localities where herds of sheep or oxen, and dogs, are associated together, and the parasite is present either in the larval condition in the former, or in the mature state as a tapeworm in the intestine of the dog, the main conditions requisite for its dissemination and indefinite multiplication are present; the dog distributing the ova of the worm abundantly about the pasture on which the cattle feed, and the cattle returning in time the developed larvæ to the dog, in such portions of their flesh as may reach him as food. Likewise, it is easy to understand, how some of these ova distributed in a like manner by the dog in gardens or other localities, may with equal facility reach the body of man, by means of uncooked vegetables, ground fruit, or water. A consideration of the abundant distribution of echinococcus larvæ in sheep and cattle, of the facility afforded under the circumstances detailed, for the rapid propagation and dissemination of the parasite, and the probability that such concurring facilities, by no means unfrequently exist to a greater or less extent in some of our military stations, cannot fail to suggest the necessity of a careful inquiry into the history of every individual case of hydatid disease occurring among soldiers.

Geographical Distribution of the T. Echinococcus.

It is very probable that this parasite has a more extended area of distribution than any of the other members of the tapeworm group infesting man. Fortunately in Iceland alone is its prevalence such as to be alarming; but between this latitude in the north, and Australia in the south, through the middle temperate regions and the tropics, we can trace its more or less frequent dissemination. In Iceland the statistics of hydatid disease are appalling. According to Schleisner, Eschricht, and Guérault, it is endemic to such an extent that a sixth part of the whole population are afflicted by it. Leuckart also says, on the authority of Krabbe, "that there are many of the Iceland doctors who not unfrequently have upwards of 100 cases under treatment (Cobbold)." It can hardly be wondered at, for the same authority mentions that for every 100 inhabitants of Iceland there are 1,100 head of horned cattle, and every peasant has on an average six dogs. In Denmark the disease has been occasionally very frequent. In the United Kingdom, as has already been remarked, we have evidence of a more than ample distribution. In Germany, in some parts, it is frequent. Frerichs mentions it is much more so in Breslau and Silesia than in Göttingen, Kiel, and Berlin. In France it is by no means uncommon. In the United States it is at present believed to be rare. In the Mediterranean there is evidence calculated to arouse a suspicion that the parasite has localized itself, and rather frequently finds access to our soldiers on that station. During the single invaliding season of 1864 at Netley three cases of hydatid disease were received, all of which were from the Mediterranean. Of twenty-three preparations of hydatid cysts in the pathological collection at Netley, I have only been able to obtain reliable information of the services of the individuals in ten instances, and it is worthy of notice that in five of these, it is exceedingly probable that the parasite was acquired on the Mediterranean station. In two others it is questionable whether in the Mediterranean or India, and the remaining three appear traceable to India. Short abstracts of the cases illustrative of these preparations, and including the services of the individuals as far as attainable, have been appended for reference. It is rather a singular coincidence too, that of several preparations of hydatid cysts from the lower animals in the Netley Museum the only one instance in which the locality whence they were received is recorded, is in the case of a preparation of the heart

of a cow, containing a large hydatid cyst in the interior of the left ventricle, and which was taken from the animal at Angustoli, Corfu. The prevalence of hydatid disease in the Mediterranean is a question well worthy of further investigation. As far as regards India, the chief authorities on diseases of that country speak of it as very rare, and with the exception of a few individual cases by Dr. Thomas, Assistant Surgeon Buzangee Rustumgee, and the late Dr. Hanbury, Surgeon, 33rd Regiment, recorded in the Indian journals, and those appended to this paper, I have not been able to obtain any further information bearing on its prevalence in that country. In the remarks by the late Dr. Hanbury on the case referred to,* he speaks in terms of having met with the disease on several occasions in India. It is very questionable whether the prevalence of the disease in India, at least as far as soldiers are concerned, is not considerably under estimated. In Australia, especially about Bendigo, it is very common (MacGillivray, Australian Medical Journal, August, 1856).

Prophylactic Measures

Bearing in view the remarks recently made regarding the propagation of the *T. Echinococcus*, and its larvæ, and the instrumentality which we have good grounds for supposing is exerted by cattle and dogs in disseminating hydatid disease, it is evident that prophylactic measures to be successful ought to be chiefly directed to these animals. In the first place, should suspicion exist of the presence of the larvæ in sheep or oxen killed in the vicinity, the organs of these animals should be carefully examined, more especially the lungs, heart, and liver, and if the parasites are discovered measures should be taken to insure their destruction on all occasions, and the butcher should be warned of the dangers liable to result from them. Especial attention should be directed to the dogs which may be denizens of garrisons. Considering the endless variety of canine favourites usually attending a regiment, suspicion must always attach itself to them as liable to be bearers of the worm, and recommendations adapted to this contingency should be matter for consideration. Owners of dogs should be warned against allowing them to frequent butcher's shops, or to feed on offal, or the usual dog's meat, obtained from the butcher. Expulsion and destruction of the tapeworm being the most direct remedy, it may be advisable under some circumstances, as Dr. Leared suggested, to administer occasionally to suspected individuals some anthelmintic. For removal of the larger tapeworms from the intestine of the dog, I have found a combination of freshly-powdered areca nut and bicarbonate of potash by far the most efficacious, in the proportion of a drachm to two drachms of the nut, and about 20 grains of the salt. This should be followed in the course of five or six hours by a dose of castor oil. Care should be taken that the evacuations are either buried or burned. Where soldiers' gardens have been formed, as in some stations of the army, it is of course desirable that dogs should be carefully excluded from them. If salads are used, they should be well washed beforehand, and all vegetables well cleansed and thoroughly boiled. Finally, the possibility of the ova of the worm reaching the drinking water supply must not be overlooked, and should be guarded against.

ABSTRACT OF CASES ILLUSTRATING PREPARATIONS OF HYDATID CYSTS.

No. 1. Prepartion $\frac{R.\ 913}{W.\ 835}$.—Hydatid cyst from the brain. Private H. M., 59th Regiment, 34 years of age, was admitted complaining of headache and hepatic tenderness, which he considered the renewal of an old complaint contracted three years before at Gibraltar. After eight days' treatment the symptoms having abated, he was discharged to duty, but sixteen days subsequently was readmitted, the most prominent symptoms on this occasion being headache, vomiting, and impaired vision. He was discharged six days afterwards, but in a few days was again admitted, complaining of similar symptoms in a more aggravated form. The same evening he became comatose and died. Post-mortem inspection revealed a large translucent hydatid cyst,

* Trans. Med. and Phys. Soc., Bombay, 1861.

containing about six ounces of fluid, situated in the anterior portion of the left hemisphere of the brain.

No. 2. Preparation $\frac{\text{R. 1626}}{\text{App. 368}}$.—Portion of liver containing a hydatid cyst. Private J. D., 80th Regiment, while serving in Bengal, where he had been for some years, was seized at Dinapore with severe dysentery, which proved fatal. No symptoms referable to the parasitic lesion were recorded. On post-mortem examination two cysts were found in the liver. In this preparation the appearances of the multilocular tumour which has been described are to be seen.

No. 3. Preparation $\frac{\text{R. 1632}}{\text{W. 1486}}$.—Hydatid cyst in the liver. Corporal E. W., 17th Regiment, a robust and strong man (who had served eleven years in India immediately prior to his fatal illness) died at Fort Pitt of bronchitis after a few days illness. No symptoms indicative of the lesion seen in the preparation are recorded. On post-mortem examination a large cyst filled with hydatids was found in the posterior convex aspect of the liver.

No. 4. Preparation $\frac{\text{R. 1883}}{\text{W. 1703}}$.—Hydatid cyst in the kidney. Private J. C., 17th Regiment, 44 years of age, died at Fort Pitt of phthisis. He was invalided on account of pulmonic disease from India, where he had served for twelve years. He had exhibited symptoms indicative of the lesion in the kidneys for some time before death, but the actual period is not stated. Post-mortem inspection revealed a very large cyst, filled with hydatids, occupying the lower portion of one of the kidneys.

No. 5. Preparation $\frac{\text{R. 1646}}{\text{W. 1500}}$.—Hydatids from a cyst in the liver. With respect to this preparation there are no records of the case, but it is stated to have been forwarded to the Museum from the Mediterranean, and the man had been three years on the station.

No. 6. Preparation 35A.—Supplementary Catalogue. *Echinococcus* cysts from the liver. Private G. B., 54th Regiment, 28 years of age, was admitted to Netley in September, 1861, with the symptoms indicating advanced phthisis, he had nine years' service, the earlier portion of which, until November 1854 (when he went to Gibraltar), was passed in England and Canada. He returned home from Gibraltar in 1856, and embarked for Bengal in 1857, remaining there until the latter end of 1860, when he was invalided home from Cawnpore. He died at Netley a few weeks after admission of phthisis, and no symptoms of the hepatic lesion were recorded during life. At post-mortem inspection a large echinococcus tumour, containing numerous hydatid cysts, was found in the right lobe of the liver.

No. 7. Preparation 35B.—Supplementary Catalogue, contributed by Surgeon A. L. Adams, 1st Battalion 22nd Regiment. Private O. P., 1st Battalion 22nd Regiment, 35 years of age, and a man of long service, eleven years of which prior to 1854 he spent in India, the intermediate period in England, embarking for Malta in 1860. He served in Malta about three years, when he was invalided, and admitted to Netley Hospital in November, 1863, suffering from hydatid disease supposed to be affecting the kidney. After some period of residence at Netley he was discharged the service in much the same state as on admission, occasionally passing hyatids by the urethra. He had manifested it is stated symptoms referable to the parasitic lesion in the kidney shortly after returning from India. His case is recorded by Dr. Adams in the "Army Medical Reports" for 1863, and the "Lancet" of October 1, 1864.

No. 8. Preparation 35C.—Supplementary Catalogue, contributed by Assistant Surgeon Flood, 106th Regiment. Private J. H., 106th Regiment, 24 years of age, and four years and three months service (passed in India, at Bombay, Poona, and Neemuch), was admitted into the regimental hospital on the 24th August, 1863, suffering from *cephalaea*, to recurring attacks of which he is stated to have been liable for some short time previously. On the 29th of the same month he was discharged to duty, and between this time and the 20th March succeeding he was on three occasions under treatment for similar attacks. On this latter date he was admitted with a more aggravated seizure, the headache being most intense and accompanied with dimness of vision. Convulsions supervening, he died on the 27th of the same month.

Post-mortem inspection revealed a hydatid cyst about the size of a hen's egg, situated about the middle of the left hemisphere of the brain, immediately below the upper surface.

No. 9. Preparation 35D.—Supplementary Catalogue. Liver containing a large echinococcus hydatid tumour. Private W. B., 2nd Battalion 15th Regiment, 22 years of age, was admitted to Netley on the 5th June, 1864, invalided from Gibraltar and suffering from enlargement of the liver, attended with ascites and jaundice. He had served five years, nearly four of which appear to have been passed in Malta; the remaining portion, up to the time of his being invalided, at Gibraltar. Indications of the hepatic lesion appear from his Medical History sheet to have manifested themselves first early in 1863 at Fort Ricasoli, Malta, where he was under treatment for *Icterus*. He died at Netley 22 days after admission. Shortly before death he vomited several small hydatid cysts. On post-mortem inspection, an enormous hydatid tumour, containing cysts of various sizes, was found occupying the greater portion of both lobes of the liver. There was great degeneration of the enveloping capsule, and the tumour communicated with the stomach by an opening about half an inch in diameter.

No. 10. Preparation 35E.—Supplementary Catalogue. Left lung containing a large echinococcus tumour. Private J. R., 1st Battalion 9th Regiment, 35 years of age, was admitted to Netley, on the 25th September, 1864, invalided from Gibraltar with symptoms referred to phthisis. He had served in the army 17 years, the earlier portion of which, till February, 1854, he had passed at home. At this time the regiment embarked for Malta and the Crimea, and in June, 1856 went to British North America, returning home in 1857. He went to Corfu in 1860, thence to Cephalonia in 1863, and subsequently to Gibraltar. He died at Netley on the 8th December, 1864. The nature of the lesion was not discovered during life. Post mortem inspection revealed a large hydatid tumour involving nearly the whole of the anterior portion of the left lung. There was considerable puckering and degeneration visible on the inner surface of the investing capsule.

SOME REMARKS ON DRACUNCULUS.

From the Annual Report of Dr. STEWART, Surgeon, 18th Royal Irish Regiment, Secunderabad.

OF all the European corps stationed at Trimulgherry during 1864, the 18th Regiment alone suffered from *Dracunculus*, which may be said to have been at one time epidemic. The first case of this disease occurred 23rd July, 1864, and between this date and 12th December, 1864, 93 cases were admitted.

But little is known of the origin of this disease, and during its incubation and progress towards expulsion from the body, the patient is generally unaware of anything unusual. Sometimes febrile symptoms, accompanied with an eruption of nettle-rash, usher in the local symptoms, which appear last; at other times, the first intimation of the disease, is the appearance of swelling generally on the upper part of the foot (the worm appearing in most cases in this locality), and this was often for the first time discovered by the inability to put on the boot; now also is generally apparent the characteristic bulla over the presenting head of the worm, which quickly assumes the size of a large hazel-nut. The swelling is accompanied by much effusion into the cellular tissue, but often the pain is but slight. On clipping away the cuticle forming the large bulla, and which is perfectly circumscribed by healthy cuticle and skin, a denuded surface (it may be half inch in diameter) of cutis is observed, and in the centre the worm can sometimes be detected, and carefully drawn out with a pair of common dissecting forceps, the end secured with a ligature and gently rolled over a piece of diachylon plaster in a cylindrical form, and fastened at each end with a strap of adhesive plaster to the adjoining skin, so

as to prevent the animal again retracting. Should the case go on well, from a few days to a month or more may be required to extract the animal, winding up a little each day. Painting the skin over the course of the worm, with tincture of iodine, seemed in some cases to hasten its expulsion, or allowing a continued stream of cold water to fall over its course from a height, was found in some instances to cause its expulsion at once, or else rendered its removal by traction easy and immediate. But in other instances, neither of these happy terminations occurred; the worm, either from its presence excited such a degree of inflammation accompanied with so much serous effusion into the cellular tissue in the neighbourhood that extensive sloughing took place, and this the more certainly if the worm, in the efforts at extraction, was unfortunately broken.

Notwithstanding free incisions and active treatment in one of the earliest cases, the patient lost nearly all the integument of the upper surface of the foot, from the ankle-joint to the commencement of the toes, and in one or two other instances it was feared that amputation might have to be resorted to, the disease causing extensive injury in the vicinity of ankle joint.

All the cases, however, did well, and with the exception of weakness of the parts involved, and inability to walk in hard boots for some time after healing, no bad results followed. The severe cases were attended with much fever and debility, increased by the profuse discharge which took place from the sloughing and diseased surfaces, and the sufferers required appropriate nourishment and stimulants to be freely administered. Now, in the majority of the cases, the disease was treated as above stated, but in several, where the course of the parasite could be ascertained by the eye or finger under the skin, and there was no reason to suppose that it dipped between muscles or wound itself round tendons, &c., the plan was adopted with success of cutting down on a portion of the animal, dissecting carefully, and separating it from its bed, which was often found to be beneath the deep fascia, passing a curved instrument, or a large ligature needle beneath it, and by using gentle traction, and pouring from a height a continuous stream of cold water over its course, effecting its immediate removal.

The first *case* in which this plan of speedily effecting a cure, and much relief from suffering, was tried, was that of a patient in hospital with another disease, and who felt and noticed something like whipcord beneath the integument of scrotum, and immediately made a report of the circumstance. As yet, no inflammation was set up, and the parasite could be felt and seen coiled in most fantastic loops beneath the integuments; a prominent loop was selected as near the centre as possible, and on a careful incision and a little dissection the animal was laid bare at this point; the loop hooked up, and the worm extracted by gentle traction. The process was much aided by the stream of water, which seems to paralyze the animal, or make it quit its place in some inexplicable manner. The worm on removal was found to measure nearly three feet in length, and, examined under the microscope, contained the young in myriads, in all stages of development. No inflammation or suppuration followed, although such an extensive track existed after its removal, and the slight cut healed as if no foreign body had ever existed. The result of this case led to the same mode of procedure being adopted in many others, but under far less favourable circumstances; for in the above, the loose texture of the scrotum offered but little resistance, and made extraction much easier. In the majority of cases, the worm made its appearance in the lower extremities, and generally about the foot. The same procedure was adopted in this situation, but with only partial success in the removal, as the animal is generally entangled in such a way in the fascia or tendons that its complete extraction is seldom possible in this way; in some instances from several inches to almost the entire animal was extracted, leaving so much less to come away by sloughing or by slowly winding it out, thus shortening the duration of the case considerably, and limiting the extent of inflammation and suppuration, and perhaps sloughing of the parts affected.

As dracunculus is supposed to have its origin in tanks and wells used for bathing purposes, every effort was made to trace the germ to the above sources. Microscopic examinations of the mud of the well, from which the bathing water was obtained, for the purpose of finding the tank-worm, were made, but

without success. Indeed, it is supposed that the period of incubation in the human subject extends over several months, so that the negative result proved nothing.

Specimens of water and mud were also forwarded to the Chemical Examiner at Madras in October last, but the result of his examination has not yet been communicated. Every barrack-room and every company gave its quota to the hospital, so that the appearance of the disease seems attributable to some one cause.

On this supposition, seeing that the other corps at Trimulgherry were under precisely similar circumstances as to locality and surrounding circumstances generally, it occurred to me that the tank from which the bathing water was obtained, being the only exceptional circumstance (as it was used solely by the 18th Regiment) might have at one period contained the germs of the disease, and hence I recommended its being discontinued and the one from which the Artillery drew their supply being used instead. This recommendation was at once attended to, and may probably have the effect of preventing a recurrence of the disease, which would seem to have its origin in the rainy season. Like all other parasitic disease, I have no doubt the one under consideration attacks individuals chiefly who are enfeebled, and whose vital resistance to change and external distributing forces is at a low ebb; and I think the manner of its appearance in the 18th Regiment (all other corps escaping) is another instance pointing to the injurious effect of keeping a body of men so long in one locality as the 18th Regiment has been.

OUTBREAK OF CHOLERA AT BARODA,

IN THE B BATTERY, 18TH BRIGADE ROYAL ARTILLERY, JUNE, 1865.

By Assistant-Surgeon J. W. BELCHER, M.D., R.A.

THE health of the battery, including women and children, was most satisfactory when stationed at Sholapoor in the Deccan, from October, 1861, when it arrived from Hyderabad in Scinde, till it marched for Baroda in November, 1864. During the year 1863 the average strength of the non-commissioned officers and men was 154, and the average daily sick 7·36.

There were three deaths: one from fracture of the base of the skull, the result of a fall; the second from organic disease of the heart; and the third from abscess of the liver, following acute hepatitis.

The women and children, with an average strength of 62, also enjoyed good health. One death only occurred during the year, from remittent fever in a sickly infant.

During the year 1864, out of an average strength of 144 non-commissioned officers and men, the average sick was 6·36, and the deaths were four: one from fracture of the skull, caused by a fall from a horse; two from cholera, on the line of march in the Southern Concan; and one from acute hepatitis, terminating in abscess.

During the first half of the year 1864 the women and children also enjoyed good health, but cholera carried off two children in August; and after the march of the battery, one woman and two young children died—the woman and one child from fever; the second child from fever, and weakness caused by worms.

I have thus noticed the previous state of health of the battery, in order the more clearly to show the general and rapid loss of health which took place after its arrival in Baroda.

On the 13th January, after a two months' march from Sholapoor, the battery arrived at Baroda with only two trivial cases in hospital; and certainly a finer or more healthy-looking body of men could hardly be seen in this country, and this was the universal remark of the residents of the station.

During the remainder of January, February, and March, the men enjoyed

good health, the average daily sick being about 3·46 to an average strength of 122.

In April, when the hot season commenced, the health of the men began to give way—fever of a severe type, accompanied generally by head symptoms, becoming prevalent.

The month of May was intensely hot and enervating, the average heat, at the hottest time of the day, in the hospital being 97·8°, and the thermometer there often registering 101°, with *punkahs* going day and night, *tatties* constantly working, and even the verandahs and bamboo frames at the sides continually watered. During this month intermittent fever became very prevalent, and nearly every case was complicated with head symptoms, often amounting to severe congestion, and requiring the application of leeches—a treatment I seldom found necessary in the fever of the Deccan. Out of 34 admissions during the month of May, as many as 21 were of this disease, while during the whole year 1864 there were only 45 cases.

Three cases of sunstroke also occurred within the space of one week, of which two proved rapidly fatal, the third recovering only subsequently to be carried off by cholera. Many men who, within my own knowledge for the last two years, had been the most active and healthy in the battery, and who were fond of hunting and shooting, as well as cricket and other athletic games, suffered from fever, and when not from actual fever, from general debility accompanied by lassitude; and numbers of trustworthy men declared to me their inability to sit their horses at equitation drill from sheer weakness. In short, the loss of health was general, the women, children, and even the native followers, suffering in like manner with the men.

Under these circumstances, on the 24th May I wrote to the Commanding Officer, calling his attention to the loss of health in the battery, and strongly recommending the necessity of lightening duties which entailed fatigue and any exposure to the sun, as much as might be consistent with the requirements of the service. The recommendations were carried out.

Such was the state of health of the battery during May and the commencement of June.

Up to the 5th June no case of cholera occurred in the station. On the 3rd and 4th preceding, the Mussulman festival of the "Mohurrum" was being celebrated; and a significant fact is that the first two cases of cholera which occurred were amongst the store lascars of the battery, who were Mahometans, and had taken a part in the festivities. The third case, on the evening of the 5th, also occurred in a native servant who had been in the city during the day witnessing the "Mohurrum," and immediately on his return he was taken to the hospital with the disease fully established.

Last year it was also remarked in Baroda that the first cases of cholera occurred at the time of the "Mohurrum." In India the first outbreaks of cholera can often be traced to the scene of native pilgrimages and festivities, and it is highly desirable that such festivals should not be held in the immediate vicinity of the lines of European troops.

Soon after the occurrence of the first case of cholera amongst the native followers of the battery, it appeared in the 19th Regiment Native Infantry, attacking two sepoys; and all three cases proved fatal during the afternoon. On the afternoon of the 6th June three more cases occurred, making six in all from among the battery followers during the 5th and 6th June.

On the 6th June there were fourteen patients in hospital, one of whom had been for some time under treatment for chronic diarrhœa of a slightly dysenteric form, from which he had suffered frequently for the last two years. A second case of simple diarrhœa was convalescent, but during the 6th there was no premonitory diarrhœa whatsoever in the battery. At about 11 P.M. on the night of the 6th I was called to see two patients in hospital—one recovering from a severe attack of sunstroke, and the other with Guinea-worm in the foot—who had just been seized with diarrhœa. Notwithstanding the most active treatment, the diarrhœa remained unchecked, finally running into cholera at 2 A.M. on the 7th. At 4 A.M. the first case from the barracks was admitted in severe collapse, with vomiting, and rice-water purging fully established; and as the man acknowledged he had been ill since 2 A.M., the epidemic may be said to have commenced almost simultaneously in the hospital

and the barracks. At 5 A.M. three children were admitted from one range of "patcheries," called the "New Patchery." All three were suddenly attacked, having had no premonitory diarrhœa, and were collapsed, and had the characteristic vomiting and purging when admitted. The disease continued to attack men, women, children, and native followers during the 7th, 8th, 9th, and 10th; and apparently was only checked by the march of the battery from the station, at 4 A.M. on the 11th June, to a camp about two miles distant. A few hours before their departure four very severe cases occurred amongst the men; and one man who returned from the camp to the station on some business, for a few hours, was seized on the 11th. This was the last case amongst the men, During the night of the 11th, this man's wife, while in attendance on him. was attacked, after which no other case occurred amongst the Europeans, About two or three hours after the battery had encamped, one child was seized and died; but this, the only case that occurred in camp, in all probability had its origin in the station.

From the 6th to the 27th June the disease continued epidemic throughout the station. The officers and their families were the only class who escaped. The disease was very prevalent in the bazaars, the city, several officers' "compounds," and amongst the men of the 19th Regiment Native Infantry. The latter corps, however, suffered comparatively little. They had 18 cases—men, women, and children—of which 9 died. Amongst the native followers of the battery there were 22 cases, of which 12 died and 10 recovered. The disease committed at the same time fearful havoc in the native city.

TOTAL of Cases of Cholera in the B Battery, 18th Brigade Royal Artillery, from the first appearance of the Disease on the 7th June, at 2 A.M., till the morning of the 12th June, when the Epidemic terminated in the Battery.

	Strength at the Commencement.	Admitted.	Discharged.	Died.	Remaining.
Officers	6	..	..	..	..
Men	128	30	16	14	..
Women	22	2	..	2	..
Children	43	10	2	8	..
Total	199	42	18	24	..

In the above Table only cases of well-marked cholera are noticed. A great many cases of severe diarrhœa were also treated, but at the height of the epidemic I found it impossible to keep any register of them. All such cases, however, were detained for treatment when it was thought necessary.

The epidemic was universal throughout the barracks generally, as well as the station; but the immunity from attack of those occupying separate bungalows, the officers and their families, and the married non-commissioned officers, was most remarkable. With one exception, all escaped; and the only separate house attacked (the Serjeant-Major's) was in a line with, and 64 feet distant from, the "New Patchery," in which so many cases occurred. In the "New Patchery," consisting of eight family quarters only two houses escaped, and in one of the two but one man was living at the time. The comparative immunity of the "Old Patchery," facing the same way, and, if there is a choice, inferior to the "New" as a building is to me inexplicable. Of four cases who were attacked when on fatigue duty at the hospital, I can only positively state that one was so seized, as from the outset he volunteered to remain permanently at the hospital. The other three cases were most probably also seized when on fatigue, but they went to and from the barrack-rooms in course of relief, and possibly may have contracted the disease there.

I would here remark that it would have been impossible to have attended to the wants of the sick had not the men of the battery been employed as orderlies. During the first days of the epidemic, as a rule, about two men

were in attendance on each case during its early stage. As the more acute symptoms (cramps, &c.) diminished, the number was always lessened as much as possible. The fatigue parties were relieved at first every three, and afterwards, when the work became heavier, every four hours. The men were cautioned to wash their hands and change their clothes when going off duty. In every case when the men complained even of great fatigue, they were relieved at once; and when diarrhœa was complained of they were detained under treatment. After some time, the men being worn out by the fatigue of continual watching, native attendants were supplied to take their places, a few Europeans only being detained to supervise; and as a rule I cannot too strongly contrast the devotion and untiring energy of the latter with the carelessness and inertness of the natives. These were constantly deserting, and as an instance I may mention that in one day, out of forty-five men sent to the hospital, only two were present to muster. When it is remembered that the natives were only brought on duty when the epidemic was on the decline, and when cramps, thirst, vomiting and purging, and other symptoms calling for much assistance, had all ceased in the surviving patients, it will be apparent that, during the early part of the epidemic, the wants of the sick could never have been supplied had we been dependent on native attendants alone. In these remarks I do not include the permanent native hospital servants, since they, I suppose from their customary attendance on Europeans, were not found wanting in cheerful willingness to assist.

The disease was of the most virulent type. Every case of the forty-two was one of strongly marked cholera; and, contrary to what is generally observed, the severity of the symptoms did not diminish towards the end of the epidemic. Indeed the last five cases were as severe as any that occurred during the outbreak.

The majority of the men attacked suffered from diarrhœa for a period varying from half an hour to six hours before the development of the disease. This diarrhœa varied much in severity, and in many cases was so slight that the men did not apply for any treatment for it until too late; but when such cases came to my knowledge they were detained under treatment.

In the following Table I have given the duration of the diarrhœa as nearly as possible.

	No Premonitory Diarrhœa. Attack sudden.	Diarrhœa for about					
		1 Hour.	2 Hours.	3 Hours.	4 Hours.	5 Hours.	6 Hours.
Men.....	6	7	7	1	2	....	7
Women ..	1	..	..	..	..	..	1
Children ..	10	..	..	..	..	..	..

In every case the collapse was severe. The cold, clammy, and damp skin, with, in some cases, profuse perspiration, the sunken features and eyes, dark blue appearance round the orbits, the whispering voice, and sunken, sodden appearance of the fingers, with blueness of the nails, a pulse thread-like, and in many cases imperceptible, restlessness, anxious look, and insatiable thirst, were all present in every case. In some of the worst cases the collapse was the most severe I have ever seen, the face and body generally being of a blueish-black colour. Ten of the men, the two women, and all the children (eight in number) who died, never rallied from this stage. The average duration of the stage of collapse was about fifteen hours.

In every case the vomiting was quite characteristic, and the stools were of the true "rice-water" like description.

In a few cases the cramps were confined to the calves of the legs, in most the legs and abdomen were affected, and in the most severe they even extended to the muscles of the thorax and of the neck.

In many of the cases when reaction appeared, the skin became very hot and dry, the head and conjunctivæ congested, drowsiness in several cases, with incoherency of speech, and general febrile symptoms, came on. A considerable number of these recovered. I remarked that in the most severe cases of *reaction* the suppression of urine continued the longest, and required the repeated use of diuretics and diluents for its restoration.

In three cases congestion of the lungs came on, with quick, hurried respiration, and some cerebral congestion, immediately on the patient's rallying from the collapse. These proved rapidly fatal, before any active treatment could be of avail. In a fourth case the congestion was more passive, but it also proved fatal, though not so rapidly.

There were two cases of intense cerebral congestion. In the first the patient had recovered from the collapse, and reaction had set in, though not very severely, when coma came on suddenly, with stertorous breathing, convulsive movements of the limbs, and a labouring strong pulse. The heart's action at the same time was forcible and tumultuous, and the surface generally was of a burning heat. The cold affusion was applied to the head and chest, and sinapisms, enemata, &c., used. The patient soon rallied from the comatose state, but the congestion of the head and strong labouring pulse continuing, leeches were applied to the temples; and afterwards he was cupped from the back of the neck, the pulse being carefully watched as a guide, and the quantity of blood taken regulated accordingly. He was cupped a second time on the congestive symptoms again appearing, and blistering fluid was twice applied to the head. He then improved, and up to the evening of the 11th day was in a fair way towards convalescence, when passive congestion of the lungs set in, and the case terminated fatally on the 12th day.

In the second case, soon after reaction came on, the symptoms were, with the exception of the convulsive movements of the limbs, the same as those described in the first. Leeches were applied, he was cupped from the back of the neck, and twice blistered on the scalp. On the active congestive symptoms disappearing, a low muttering delirium came on, no doubt from weakness. Nourishment and stimulants were freely used, and the patient made a most favourable recovery.

It is remarkable that in both of these cases of severe cerebral congestion the suppression of urine was most complete, and the secretion was more slowly and with greater difficulty re-established than in any of the other cases; and during the epidemic I noticed that the more severe the reaction the more slowly was the secretion of urine restored.

In one case only was hiccough observed as a distressing symptom, and it apparently depended on extreme weakness, and continued unchecked till death.

Treatment.

1. *Of the Premonitory Diarrhœa.*—When such cases came to my notice they were detained, when thought necessary, in a supplementary hospital at some distance from the hospital occupied by the cholera patients. Acetate of lead and opium, calomel and opium, draughts containing tincture of opium, aromatic spirit of ammonia and peppermint or cinnamon water, in some cases two drachms of brandy combined with thirty minims of the strong solution of ammonia in a draught, or brandy and soda-water, were chiefly used as astringents and stimulants in this premonitory diarrhœa. In some cases the strong solution of ammonia, combined with brandy, was found very efficacious. At the same time these cases were kept warm in bed, and detained until well. A great number of cases of diarrhœa were thus treated with success.

2. *Of the Stage of Collapse.*—Brandy and soda-water, and aromatic spirit of ammonia, were chiefly used as stimulants. About two drachms of brandy, at intervals of a quarter to half an hour, and thirty minims of aromatic spirit of ammonia, were the quantities given as a rule; but of course the quantity of stimulants, and the frequency of their administration, varied according to the requirements of special cases. The strong solution of ammonia, combined with brandy (in the quantities already mentioned), was found a most powerful stimulant when well borne; but in the majority of the cases it could not be used, owing to the intense irritability of stomach it occasioned. Acetate of

lead with opium was occasionally given in this stage; but owing to the fear of undue reaction, opiates were given during the collapse with caution. Beef tea, chicken broth, and arrowroot with wine in small quantities, were used as nourishment. Soda water was given in small quantities at a time, as frequently as desired by the patient. The cramps were treated with shampooing and friction, mustard poultices, turpentine stupes, and strong chloroform liniment—the latter, in very many cases, appearing to give great relief. In two male patients and one child even towards the latter end of this stage, nothing either in the way of stimulation or nourishment could be retained. Strong beef tea and chicken broth enemata, combined at first with opium and acetate of lead, were used. In the case of the child, it being almost impossible to give any nourishment by the mouth, these strong nutritive enema were used for nine days, and the little patient made a favourable though slow recovery.

The distressing hiccough in one case was treated with sulphuric æther, chloroform, chloric æther, and opium—mustard poultices, &c., being applied over the diaphragm—but all with no avail.

3. *Of the Stage of Reaction.*—As before remarked, febrile symptoms with congestion of the head were very common when reaction came on. Cold was constantly applied to the head, diaphoretics were given, and diuretics (nitrate of potash and nitrous spirits of æther) with diluents used when necessary, the stimulants being discontinued. Mustard poultices were used to the calves of the legs and the soles of the feet as derivatives. At a later stage, when the stools became tinged with bile, calomel generally with opium, or blue pill with hyoscyamus, were used once or twice; but as a rule it was not found necessary to repeat them often. When the bowels became confined, castor oil, internally or by enema, was given, the enema being the most useful form. Gastric irritability, with a thickly-furred tongue, and distension of the stomach from wind, was most common in this stage, and was treated with effervescing draughts and dilute hydrocyanic acid, with carminatives, such as tincture of cardamons and cinnamon water, blue pill and rhubarb occasionally; mustard poultices being also used over the stomach.

4. *Of Cerebral and Pulmonary Congestion.*—In the milder cases of the former, the constant application of cold, with diaphoretics and diuretics internally, and castor oil enemata, was found sufficient. In the more severe cases the cold douche, leeches to the temples, cupping from the back of the neck, and blisters to the scalp, with calomel internally, and aperient enemata, were resorted to.

The congestion of the lungs in four cases was too rapid to admit of any very active treatment. Mustard poultices to the front and back of the chest, turpentine stupes, &c., were used. In the only other case it was of a passive nature, and only admitted of the same local treatment, depletion being quite out of the question.

The *convalescence* of the majority of the cases was tedious, owing not only to the severe type of the disease from which they had suffered, but also to the intense heat of the weather, which was very trying, and which no doubt aggravated many of the cases of congestion.

FURTHER OBSERVATIONS ON PANDEMIC WAVES.

Shewing their Period, Limits, and Rate of Progress, and their connection with Terrestrial Magnetism.

By Robert Lawsen, Esq., Deputy Inspector-General of Hospitals.

A paper appeared in the Sanitary Report of the Army for 1861, in which I drew attention to the connection of the successive outbreaks of fever in various parts of the world with a series of waves proceeding, at intervals of a few years, from the southern to the northern hemisphere. From the extent these embraced in longitude, and the length and regularity of their course, they evidently depended on some general law, which, as their progress seemed uninfluenced by atmospheric currents, was most probably terrestrial. As the

waves reached a higher latitude in Europe than in North America at the same time, the position of the magnetic pole, close to the north of the latter, suggested the connection with magnetism. The paper must be regarded however, as little more than a preliminary enquiry, in which the existence and course of the waves was recognized without their period and limits being defined, or any attempt made to trace them to their causes. The object of the present communication is to afford information on these points, as far as the materials in my possession seem to authorize.

I. *The Period of the Waves.*

If the records of disease at any place where fever constitutes a material portion of the sickness be examined, it will be found that, for the most part, the serious outbreaks occur either in the odd or in the even years, according to its geographical position. There may be epidemics in the alternate years, but far more frequently they show themselves in the year peculiar to the station. Thus, at Sierra Leone there were some cases of yellow fever in 1817, a severe epidemic in 1823, another in 1839, one case in 1835, a severe epidemic in 1837, three cases in 1845, another severe epidemic in 1847, and again another in 1859, all of them odd years. In Jamaica there were very severe epidemics of yellow fever in 1819, 1825, 1827, 1831, 1837, 1841, 1853; there has been considerable mortality in the even years, occasionally from fever, but as will be shown hereafter the excess fell on the odd years. Yellow fever appeared at Gibraltar in 1804, 1810, 1813, 1814, 1828, besides threatening to do so on several other occasions; of the five periods thus given four are even years, and one only an odd year. These facts show the waves to have a period of two years, or of some multiple of that; but, on the whole, the two yearly period seems to represent them best.

In the former paper a Table was inserted giving the millesimal ratios of mortality among the troops, each year, at the various military stations for which the records were available. To facilitate reference the same information has been repeated here, but differently arranged, and with the mortality from acute and chronic dysentery and diarrhœa added. These affections of the bowels, though distinguished from each other in the returns, and often sufficiently marked in practice, yet, at other times, pass into each other in such a manner that, in the present enquiry, it is better to class them together than, for the sake of apparent exactness, to separate complaints which in many instances seem to be intimately connected.

Table I contains the annual millesimal ratios of the deaths from fever, and from diarrhœa and dysentery, the data for which are given in the Statistical Reports on the Mortality in the Army from 1817 to 1846. Up to 1836 the returns for the year were closed on 20th December, subsequently they were made up from 1st April to 31st March in the following year. The months embraced in the year, therefore, differ in the two periods, but as the sickly season amongst the troops in the Mediterranean and American stations (as will be shown below) does not commence before May or June, no error of consequence will arise from comparing the ratios for the period 1837-46 with those for the preceding one 1817-36.

Table II embraces ratios deduced from data obtained from various sources, and the admissions into various fever hospitals in the United Kingdom, and the Seraphim Hospital in Stockholm. The ratios for the Navy on the Coast of Africa embrace the deaths from all diseases; but as all were from fever except about 20 0 per 1,000 of strength,* by deducting this number from the figures in the Table, the actual loss from fever may be obtained very nearly. In Edinburgh the returns of admissions of fever cases were closed on 31st December each year, to 1825 exclusive; subsequently they were made up to 30th September, so that 1826 gives the admission for nine months only, and then for the subsequent years anticipate the end of the year by three months from which it results that the sickness during the last quarter of each is thrown into that of the following one, increasing it unduly, and reducing that for the current one to a corresponding extent. This will account, in part at least, for the admissions in the even years, the second year of the waves at Edinburgh, exceeding so much those in the odd years subsequent to 1826.

* Bryson, Climate and Principal Diseases of African Stations, p. 178.

TABLE I.—Millesimal Ratios of Deaths from Fevers, and from Diarrhœa and Dysentery, among the White Troops at undermentioned Stations each Year.

Years.	Cape Town.		Cape		Mauritius.		Ceylon.		Jamaica.		West Indies.		Gibraltar.		Malta.		Ionian Islands.		Bermuda.		Canada.		Nova Scotia.		Home Stations.					
																									Dragoon Guards & Dragoons,		Foot Guards.		Infantry Line.	
	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery and Diarrhœa.	Fevers.	Dysentery & Diarrhœa.	Fevers.	Dysentery & Diarrhœa.	Fevers.	Dysentery & Diarrhœa.
1817	...	...	...	...	...	...	29·6	22·1	60·9	10·3	59·4	65·4	...	...	1·6	1·6	30·3	7·0	...	2·3	3·2	3·9	1·8	4·9	...	...	...	...	...	...
1818	...	1·5	...	...	1·1	10·7	133·8	55·5	71·0	4·7	60·9	38·3	5·8	2·9	5·6	3·0	14·0	3·1	16·2	6·1	1·8	1·3	...	0 4	...	...	...	...	...	...
1819	2·5	1·7	...	...	1·2	7·9	40.3	34·8	273·8	5·5	39·0	20·9	2·5	2·2	3·3	5·3	19·2	3·3	229·4	4·3	1.7	1·4	2·9	2·9	...	...	...	...	...	...
1820	2·5	1·5	...	...	0·7	12·9	4·4	23·3	134·6	4·7	78·7	12·0	3·0	0·7	3·2	2·6	7·0	3·5	3·0	3·0	0·6	...	2·0	...	...	...	...	...	...
1821	...	2·5	...	...	1·5	8·5	10·8	18·0	94·4	6·5	67·1	17·3	3·6	1·4	1·0	3·6	24·7	2·6	14·3	...	2·8	0·3	...	0·5	...	...	...	...	...	...
1822	2·5	6·5	4·8	3·2	...	6·7	28·8	22·2	154·6	4·3	47·0	9·4	2·2	0·7	6·2	2·4	13·5	2·6	3·1	6·2	1·3	...	1·9	0·5	...	...	...	...	...	...
1823	1·5	1·5	1·7	...	0·8	6·4	20·0	13·5	52·7	4·4	23·0	7·6	0·7	0·4	1·5	1·0	19·0	2·4	13·9	3·5	3·4	0·3	2·0	0·5	...	...	...	...	...	...
1824	3·0	0.8	...	2·1	0.8	8·4	104.9	29·2	67·4	3·7	43·2	8·2	5·3	3·6	7·0	8·1	18·7	3·0	14·2	14·2	2·3	...	0·5	...	...	...	...	...	...	...
1825	6·7	3·0	...	8·6	0.9	4·4	27·6	26·9	287·8	6·4	38·5	16·8	3·2	3·2	2·3	1·7	8·3	3·2	3·7	..	4·3	0·7	1·8	0·9	...	...	...	...	...	...
1826	0·8	3·0	2·6	...	3.0	6·7	3·2	21·6	69·6	1·5	30·3	13·2	4·2	0·8	2·4	1·9	11·0	0·3	1·6	1·6	3·2	0·7	0·9	...	...	...	...	...	...	...
1827	4·2	3·5	...	...	0·6	3·5	12·4	23·3	213·6	2·9	52·2	14·8	1·9	1·6	2·3	2·3	16·0	2·0	4·5	...	4·6	0·7	2·7	0·5	...	...	...	...	...	...
1828	5·2	...	5.6	5·6	7·0	17·7	9·3	11·6	64·3	2·0	49·0	12·4	121·1	1·7	3·3	2·8	20·8	4·3	...	2·9	3·2	...	0·5	0·5	...	...	...	...	...	...
1829	...	...	...	1·7	1·2	12·7	3·9	22·4	40·6	1·8	21·1	8·4	1·1	0·5	0·4	3·9	13·4	5·0	...	1·4	1·6	0·7	2·6	1·3	...	...	...	...	...	...
1830	0·9	...	1·7	1·7	3.1	4·4	5·0	20·5	77·4	2·5	28·5	14·8	1·4	0·8	2·6	7·0	13·3	2·2	...	1.3	1·6	...	0·4	...	0·9	0·8	1·8	0·4	2.0	...
1831	1·7	1·7	...	1·7	...	14.1	4·6	14·6	106·6	5·8	30·5	14·9	3·2	0·3	3·4	3·4	7·7	0·9	2·5	4·2	1·6	0·6	6·5	...	2·5	0·3	1·7	1·1	5·0	...
1832	0·9	3·6	...	1·8	1·6	9.7	8·3	23·8	91·3	1·5	10·8	23·1	2·5	0·3	1·0	2·4	1·8	3·7	...	5·2	2·9	0·4	0·9	...	0·8	...	1·2	...	3·1	0·6
1833	...	0·9	...	...	2·7	9·4	2·5	15·0	61·1	6·4	13·3	16·2	0·7	0·3	1·9	0·9	5·5	2·1	2·6	9·0	0·8	0·8	1·1	...	0·9	0·3	2·0	...	3·5	...
1834	...	0·9	...	...	2·7	10·4	2·9	11·6	56·4	7·6	10·6	14·1	1·3	3·5	6.4	1·8	6·1	1·2	1·4	2·8	2·4	0·8	1·5	1·0	0·6	0·5	2·3	0·4	0·9	0·3
1835	3·4	...	...	...	...	12·9	11·0	26·4	54·8	3·1	22·2	16·1	0·3	4·0	0·5	1·4	3·1	1·5	...	1·5	2·4	...	0·9	...	2·2	...	0·7	0·4	1·7	...
1836	1·0	1·3	...	...	2·6	12·2	4·3	16·2	39·9	0.7	34·1	24·7	1·9	1·6	2·3	4·1	3·6	0·6	1·5	7·7	2·4	...	0·5	...	1·5	0·3	2·1	0·2	4·4	...
1837	...	...	...	...	...	...	...	...	...	...	...	...	0·9	0·9	2·8	3·7	12·1	1·2	4·8	4·8	2·8	0·3	3·0	1·8	2·4	...	4·9	0·2	3·4	0·5
1838	...	...	...	...	...	...	...	...	...	...	...	...	4·7	2·4	0·9	2·3	1·7	1·3	...	3·2	2·7	0·6	2·8	4·7	1·8	...	2·6	...	2·9	0 3
1839	...	...	...	...	...	...	...	...	...	...	...	...	...	0·7	2·4	0·9	4·0	...	1·4	4·3	2·5	0·3	1·0	1·7	1·5	...	1·5	...	2·2	0·1
1840	...	...	...	...	...	...	...	...	...	...	...	...	2·0	1·2	0·4	0·8	4·4	0·8	0·9	1·8	2·0	0·6	0·9	0·6	0·7	0·6	3·4	...	3·9	0·2
1841	...	...	...	...	...	...	...	...	...	...	...	...	1·2	1·8	1·5	4·2	8·9	2·5	3·4	2·7	2·7	1·0	0·3	0·9	1·3	...	3·1	...	2·2	...
1842	...	...	...	...	...	...	...	...	...	...	...	...	1·1	2·0	1·9	1·9	4·6	1·8	6·3	3·5	2·0	0·3	1·3	0·3	2·0	0·4	1·6	...	1·8	...
1843	...	...	...	...	...	...	...	...	...	...	...	...	1·1	0·6	...	3·1	6·3	0·7	121·6	...	2·2	0·6	0·8	0·8	1·7	0·2	1·6	...	2·2	0·1
1844	...	...	...	...	...	...	...	...	...	...	...	...	1·2	...	3·8	2·1	4·9	...	0·7	1·5	1·2	0·4	1·6	0·8	1·0	0·3	1·4	0·2	2·4	0·2
1845	...	...	...	...	...	...	...	...	...	...	...	...	3·9	1·2	1·1	4·3	2·5	...	...	0·8	1·1	0·4	...	...	0·5	...	3·2	...	1·3	0·1
1846	...	...	...	...	...	...	...	...	...	...	...	...	6·7	2·1	3·0	0·5	6·8	0·4	0·8	0·8	1·8	0 1	0·4	0·4	1·3	0·4	1·2	...	3·5	0·4
Sums Odd years	20·0	14·8	1·7	12·0	8·9	79·8	162·7	217·0	1246.3	53·1	366·3	197·8	21 3	19·1	26·0	41·3	181·0	34·5	402·1	39·3	37·7	12·0	27·4	16·7	13·0	1·3	18·7	1·7	21·5	0·8
Sums Even years	16·8	19·2	14·7	14·4	22·8	99·8	304·9	236·6	836·5	32·6	392·5	170·2	164·4	24·3	50·0	43·7	132·2	28·5	49·7	61·3	31·4	5·2	16·1	9·2	10·6	3·3	17·6	1·2	24·9	2·0
Means Odd years	2·22	1·64	0·28	2·00	0·99	8·87	16·27	21·70	124·63	5·31	36·63	19·78	1·52	1·36	1·73	2·75	12·07	2·30	26·81	2·62	2·51	0·80	1·83	1·11	1.63	0·16	2·34	0·21	2·69	0·10
Means Even years	1·68	1·9:	2·10	2·06	2·28	9·98	30·49	23·66	82·65	3·62	36·25	17·02	10·96	1·62	3·33	2·95	8·81	1·90	3·31	4·09	2·09	0·35	1·07	0·61	1·18	0·37	1·96	0·13	2·77	0·22

TABLE II.—Millesimal Ratios of Deaths from Fever each Year in Places mentioned, and Admissions into the Fever Hospitals specified in Headings.

Years.	White Troops, Cape and Natal (a).	White Troops, St. Helena (b).	Navy, Coast of Africa, all Diseases (c).	White Troops, Honduras (d).	White Troops, Jamaica (e).	White Seamen, Demerara (f).	White Troops, Sierra Leone (g).	Civil Population, New Orleans, Yellow Fever (h).	White Troops, Bahamas (i).	Civil Population, Malta (j).	England, Registrar General (k).	Admissions into Fever Hospitals (l).						Stockholm, Seraphim Hospital.
												London.	Cork.	Dublin.	Glasgow.	Edinburgh.	Aberdeen.	
1816...			...	...			...	...	...	...	...	...	...	...	...	...	...	...
1817...			...	...			...	24·8	154	...	...	760	3,440	6,542	714	485	...	...
18 8...		6·0	...	...			...	...	...	2·8	...	599	6,054	25,502	2,336	1,546	...	...
1819...		1·4	...	...			...	16·2	476	2·8	...	524	2,398	3,873	1,594	1,088	...	...
1820...		2·3	...	...			...	14·7	53	2·4	...	437	1,117	2,994	289	638	...	...
1821...			...	...			...	...	71	1·9	...	232	1,047	2,976	234	327	...	...
1822...			...	...			...	25·5	80	2·6	...	246	1,159	2,300	229	355	...	...
1823...		Civil Population:	...	133			...	...	324	3·3	...	283	1,596	2,668	269	102	...	...
1824...			...	...			...	3·0	138	2·4	...	444	1,405	4,679	523	177	...	...
1825...			61·8	91			...	2·8	45	2·4	...	503	2,809	4,353	897	341	...	...
1826...		2·2	54·7	522			679·5	...	357	1·6	...	582	4,341	10,612	926	450	...	...
1827...		2·2	41·9	131			632·7	...	...	1·7	...	611	4,312	6,500	1,084	1,875	...	...
1828...		...	84·6	50			98·6	2·5	...	1·7	...	534	1,381	2,964	1,511	2,013	...	...
1829...		...	255·1	50			25·9	2·9	444	1 7	...	472	838	3,170	865	771	...	...
1830...		...	107 9	...			70·2	18·9	...	1·7	...	475	1,024	3,170	729	346	...	...
1831...		0·7	28·0	33			...	2·4	53	1·6	...	619	1,278	3,602	1,657	758	...	...
1832...		0·9	35·2	67			...	...	111	1·6	...	444	2,183	3,991	2,733	1,394	...	...
1833...		0·9	21·4	42			...	7·3	100	1·8	...	249	840	3,332	1,589	878	...	...
1834...		...	29·0	37			...	17·7	...	2·1	...	360	1,196	4,824	2,003	690	...	...
1835...		1·8	23·3	53			0·5	1·6	...	3·2	...	250	1,924	4,672	1,359	826	...	...
1836...			16·6	...			2·9	4·5	...	...	...	264	4,076	5,585	3,125	652	...	...
1837...	2·5	...	128·8	...	55·3	61·0	290	...	...	...	...	896	3,163	6,595	5,887	1,224	...	...
1838...	0·7	...	129·9	...	22·4	69·8	35	19·1	...	...	1·27	976	1,585	4,042	2,228	2,244	515	...
1839...	1·0	...	69·6	...	44·3	37·8	102	...	...	...	1·04	530	1,970	5,358	1,529	1,235	1,200	...
1840...	0·9	...	37·4	...	52·1	15·6	127	10·9	...	...	1·12	234	2,441	4,329	3,335	782	575	211
1841...	...	...	63·6	...	352·9	32·5	69	...	...	...	0·95	250	1,467	2,872	2,578	1,372	437	326
1842...	...	...	32·3	...	...	32·1	75	16·8	...	...	1·02	252	1,225	2,375	1,104	842	282	443
1843...	1·4	...	18·1	...	...	5·8	...	2·6	...	...	...	1,385	1,162	2,529	3,467	2,080	1,280	238
1841...	1·8	...	25 1	...	...	3·1	74	5·8	...	...	...	578	1,340	2,863	1,468	3,339	780	222
1845...	1·1	...	47·6	...	...	2 5	...	1·0	...	...	...	477	2,799	2,954	535	683	378	199
1846...	4·0	...	...	...	...	1·7	34	...	...	...	...	506	3,262	4,555	1,565	693	377	518
1847...	2·0	...	...	...	...	...	102	1·6	...	...	1·81	1,259	5,698	5,875	5,244	3,688	683	132
1848...	1 4	...	...	...	...	...	94	21·3	...	...	1·27	967	1,249	2,472	1 515	4,693	1,648	104
1849...	0·3	...	...	...	...	...	63	7·5	...	...	1·05	401	2,565	2,977	570	726	584	66
1850...	0·5	...	...	...	...	...	...	6·3	...	...	0 87	361	1,756	2,096	597	520	255	284

Notes.

(a) From Returns in Principal Medical Officer's Office, Cape of Good Hope.

(b) From Statistical Reports on Health of Army, 1817-36, St. Helena, pp. 15*a*. 16*a*.

(c) Bryson, Climate and Principal Diseases of African Stations, p. 177.

(d) From Statistical Reports, Army, 1817-36, West Indies (Appendix XXVI.) The number under observation very small.

(e) Returns in Principal Medical Officer's Office, Jamaica.

(f) Data from Blair, Account of last Yellow Fever, Epidemic of British Guiana, pp. 4, 5 (1850).

(g) From Statistical Reports Army, 1817-36, Western Coast of Africa. The data for officers obtained by myself at Sierra Leone. Numbers small.

(h) From data in Barton, on Cause and Prevention of Yellow Fever, from Chark, p. 109, and Table Introduction xviii.; and in La Roche, on Yellow Fever, vol. i., p. 542-3.

(i) From Statistical Reports, Army, West Indies, Appendix XXV. The numbers very small.

(j) *Ibid.*, Mediterranean, Appendix III.

(k) From Annual Reports of Registrar-General.

(l) Murchison on Continued Fevers, p. 37. The numbers for 1816 are from original sources. In Cork and Dublin the admissions include all cases of acute disease. In Edinburgh, previous to 1826, the reports were made up to December 31, but afterwards to end of September, so that the number for 1826 infer nine months only. In Glasgow, up to end of 1831, the reports were made up to January 4, subsequently to March 31. Consequently the entry for 1832 contains admissions for fixed quarters.

In Table II the mortality for all the odd years, at each station, has been added together, and the mean taken, and similarly for the even years, and it will be seen that in every case it is greater in one or other, and that, generally, the excess of the mortality from bowel-complaints falls on the same year. The high means for the even years at Gibraltar, and the odd at Bermuda, may be thought owing to the exceptional years 1828 at the former, and 1819 and 1843 at the latter; but if for the ratio of 121·1 at Gibraltar in 1828, that for 1818, viz, 5·6, be substituted, the average for the even years will be 3·26, as against 1·52 for the odd; and if for 229·4 in 1819, and 121·6 in 1843, at Bermuda, that for 1·21, viz., 14·2×2 be employed, the average will be 5·31 for the odd years, as against 3·31 for the even one, showing in both cases a decided preponderance of the mortality in the one year over the other, independent of these severe epidemics.

II. *The Season at which Mortality occurs at each Station.*

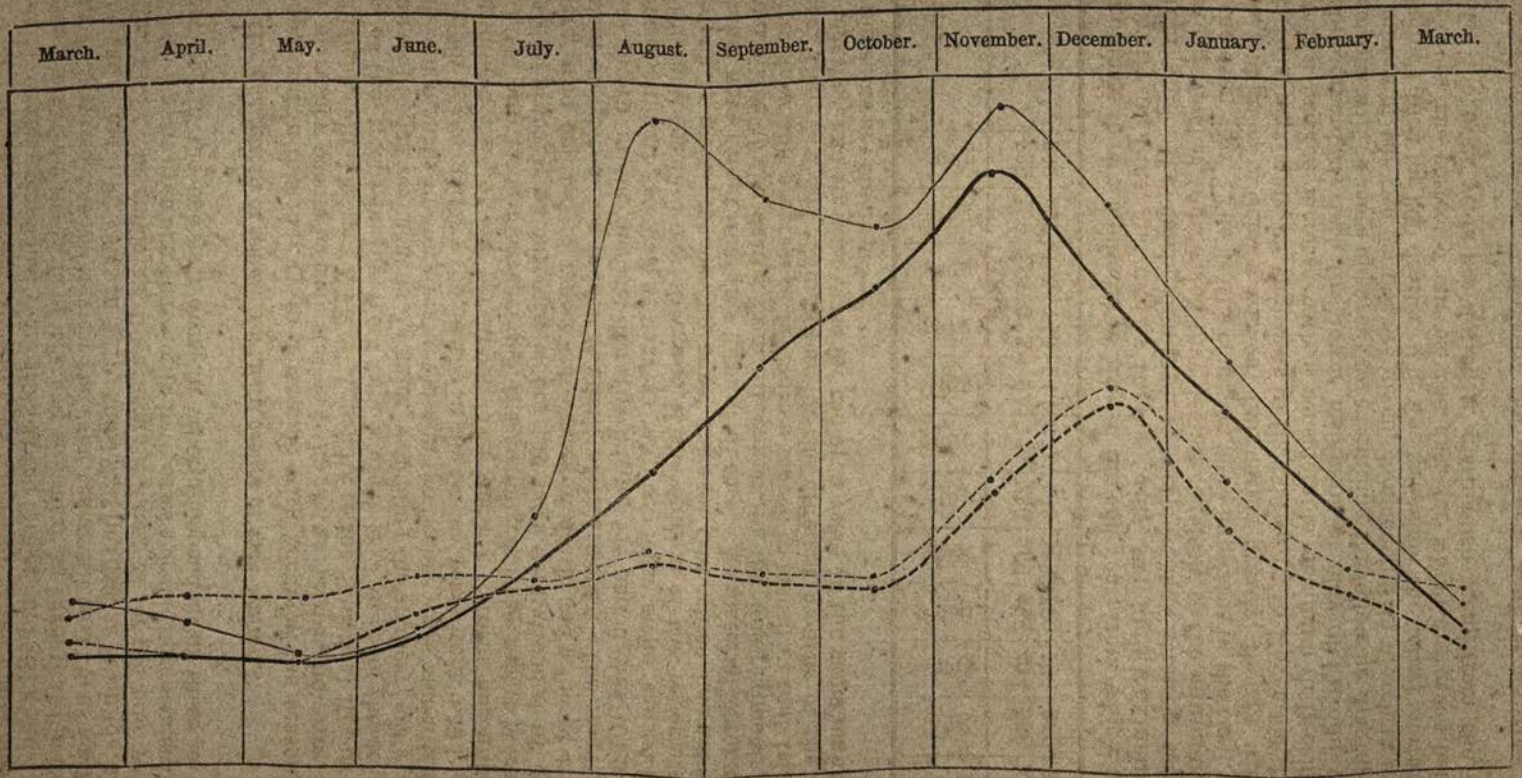
It is important in this inquiry to determine with accuracy the season at which the mortality occurs at each station; the facts available, however, are often insufficient. In Abstract XXX of Appendix to the Statistical Report on the health of the troops in the West Indies, from 1817 to 1836, the deaths from all causes in each regiment in Jamaica, excluding the artillery, are given for the different months in every year; these in the twenty years amounted to 6,117. Including the artillery the deaths in the twenty years were 6,596, out of a strength of 51,567, or 127 per 1,000. The Medical Returns account for 121·3 per 1,000 only; the difference 6·5, the compilers of the report were of opinion, arose probably at outposts, where the men were attended by civil practitioners, who omitted to report the causes of death, and a few of them from accident or violence too sudden to admit of treatment.* The mortality from fever, shown in the Medical Returns during the period, was 101·9 per 1,000 of mean strength, so that, as near as may be, fever alone caused five-sixths of the total specified mortality, and if the opinion of the reporters be correct, which is most probable, an equal ratio of that which has not been specified must have arisen from this form of disease. No material error then will be committed if the deaths from all causes, in the line-regiments, be employed to show the progress of fever from month to month in that Island. Taking them, therefore, and adding those for the different months of the ten odd years together, and treating those for the even years in the same manner, the following sums are obtained:—

Years.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
Odd Years	228	159	145	123	99	124	236	569	498	474	568	474
Even Years	332	229	135	149	149	171	162	188	170	165	250	320

These numbers show a minimum in May in the odd year, from which they increase slightly in June, and rapidly through July, to a high maximum in August, from which the deaths diminish to October, but attain a second maximum in November, from which they decline regularly to the minimum in March in the even year. The deaths continue more numerous in the even year up to June, and go on to October without fluctuating greatly, though with a disposition to a maximum in August as in the odd year; in November, however, there is a marked increase with a considerable maximum in December, which declines regularly into the lower minimum of May of the odd year. These inflections will be more apparent on examining the following diagram in which the curves of the two periods are given, commencing in March in each, the scale being 1 inch for 200 deaths. The fine lines show the actual mortality, the thicker lines the corrected curves, the data for which are given below. The lines for the even years are dotted to distinguish them from the odd years.

The course of the curve to July in the odd year, and its position for October and November, indicate some disturbing cause in August and Sep-

* Statistical Report on Health of Troops in West Indies, p. 44.


March.
April.
May.
June.
July.
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tember, and on investigation this appears to be so. In 1819 the 50th Regiment arrived in the Island in March from Europe, and the 92nd in June also from Europe, and both suffered very severely at Up Park Camp in the latter part of July, in August, and September. In 1827 the 84th arrived on the station from Europe in February, and was quartered at Fort Augusta; the regiment remained healthy for some time, but in August lost very many men, and had to be removed from that station. The deaths in these corps from their arrival in Jamaica to March of the following year were as below:—

	April.	May	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March.
Deduct Deaths in 50th, 92nd and 84th Regiments.. ..	2	4	4	59	304	139	55	35	77	53	19	2
From Deaths in Ten Odd Years.. ..	123	99	124	236	569	498	474	568	474	332	229	135
Total ..	121	95	120	177	265	359	419	515	397	297	210	133

The remainder it will be seen presents a regular rise from June to November, after which it declines equally regularly into the minimum of March of the even years, as in the previous case. The last numbers have been inserted in the diagram and joined by a thick line which brings out their character clearly. As will be seen below, however, farther corrections must be made both to April and March.

There is reason to conclude that the high mortality from March to June, in the even years, was owing to a similar disturbing cause. The 33rd and 91st Regiments arrived in Jamaica from England in February, 1822; in that month they lost two men only, but the following they became sickly, and continued so till June.

	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
Deduct Deaths in 33rd and 91st Regiments..	25	56	55	35	5	4	2	12	11	9	30	8
From Totals in Ten Even Years	135	149	149	171	162	188	170	165	250	320	228	159
Total ..	110	93	94	136	157	184	168	153	239	311	198	151

These numbers give a minimum in April and May of the same value as that in May of the odd year, from this they rise to a low maximum in August, from which they decline to October; but rise again rapidly through November to a considerable maximum in December, from which they fall regularly to March in the odd year.

The curve in March and April of the odd years has been materially influenced in the same way; of the 145 deaths in March of the ten years no less than 50 occurred in the 77th Regiment, in that month in 1825; and of the 123 in April of the ten years, there were 31 in the 77th in the same year. The deaths in this corps were 5 only in February, and 7 in May, not more than the general average. There were besides the 77th, the 33rd, 50th, 91st, and 92nd Regiments in Jamaica at this time, the deaths in all which were only 8 in March, and 7 in April, allowing a proportional mortality for the 77th in place of their high one, the total for these months would be reduced by 48 and 29 respectively, or to 97 for March, and 94 for April, which numbers have been taken for the corrected curve accordingly.

These facts show that the period of greatest activity of the causes of fever in

Jamaica is November and January, from which they decline in force till March and that the greater activity in a series of years falls on the odd years, the lesser on the even. From March to June in the odd years these causes are least active, but they increase rapidly in power from the summer solstice, and culminate in November only, after which, owing to their diminished force, fever declines rapidly to March of the even years. In the even years they increase in June rather more than in the odd; but in July, instead of the rapid development they undergo in the odd years, the even present a very gradual one, declining slightly after August; but it is not before November that a decided expansion of the mortality takes place, which then leads to the maximum in December, and from that gradually to the minimum in March of the odd years. These fluctuations seem fairly explicable on the assumption that after the summer solstice, in the odd years, a wave with a two-yearly period approaches Jamaica, which increases the activity of the local causes of disease, and leads to a high rate of mortality culminating in November; but this diminishes as the local causes lose their force by the change of season. In the even year its force seems greatly lessened, for there is but a faint trace of rise in August, and it is only in November and December, when the local causes attain their greatest activity, that a decided increase takes place, and then to scarcely more than half the extent that occurs in the odd years.

It has been stated above that, though the force of epidemics of fever falls on the odd or even year peculiar to the station, yet occasionally it is found that the regular year may pass with little disease, while there may be a pretty severe outbreak the following one, instances of which were given, and many more might have been offered. The same is frequently met with among the individual stations of a group, under the same general conditions as to geographical position and climate, one or more of these showing an excess of disease in years when those in the neighbourhood are comparatively free from it, examples of which from the Ionian Islands, the Windward and Leeward Islands, and Jamaica itself, were detailed in the previous paper.* These peculiarities are readily explained on the principles advocated above; the influence of the wave seems to be developed chiefly through the instrumentality of the local causes at the time, whether those peculiar to the place, the meteorological phenomena, or the social condition, or susceptibility of the population. Should all, or most of these, be favourable, much disease may be produced; but should most, more especially the purely local causes, or the meteorological conditions, be unfavourable, the wave may pass away with little apparent effect. Though the first period of the usual activity of the local causes may have passed, however, without any material outbreak of disease, should these have become favourable for its manifestation in the second, the progress of the curve, in the unhealthy period of the even year in Jamaica, indicates clearly that a very serious epidemic is then still possible, and experience shows it is not infrequent.

Another most important question, illustrated by the diagram, is the influence of susceptibility in new-comers, in determining both a greater liability to fever, and an increased mortality from it, than is found among those who are more acclimatized by a longer residence. The 50th and 92nd Regiments, together amounting to 1,316 men, were sent to Up Park Camp, near Kingston, on their arrival in 1819, where they were healthy for some time; in July they began to get sickly, and in August and September the mortality was tremendous. The 58th and 61st were the other corps in Jamaica during the epidemic of 1819; these had been in the Island since December, 1816; their strength in July was 1,323. The deaths in each of these bodies in the corresponding months were,—

	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March.
50th and 92nd Regts.	2	4	4	58	192	119	45	38	61	19	8	1
58th and 61st „	15	13	4	6	18	33	40	68	26	14	8	12

* Sanitary Report for the Army for 1861, p. 404.

These numbers not only show a much lower rate of mortality among the troops some time in the country than in those who recently came to it, but also that the latter were affected much earlier in the season than the usual period of sickness in the Island generally, or, indeed, at the particular station they then occupied.*

In 1827 the 84th Regiment, numbering 554 men in July, was quartered at Fort Augusta where it was much crowded, but it remained healthy till August, when fever appeared; at this time a portion of the corps was sent to Up Park Camp to relieve the crowding; but, the sickness continuing, the whole were removed to Airey Castle, an estate on the high ground near Stoney Hill, where their health soon began to improve. Besides the 84th there were at this time in Jamaica the 22nd, 33rd, 77th, and 91st Regiments, of these the 33rd and 91st had been in the country five years, the 77th three years, and the 22nd since December *only*; but it was quartered at the comparatively healthy station of Storey Hill. The united strength of these four corps in July was 2,030. The deaths each month were,—

	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March.
84th Regiment	..	..	..	1	112	20	10	15	16	16	11	1
Other Corps	5	2	1	9	36	98	98	112	57	30	14	8

In this then, as in the previous case, men recently from a cold climate suffered much earlier and more severely than others who had been longer in the country. The same was presented in 1841 in a battalion of the 60th Rifles, which landed in Jamaica about the middle or end of May that year from the Ionian Islands, and which was partly quartered at Fort Augusta and Port Royal. Fever broke out among them in July and August, and caused immense mortality.

In the healthy months of the even year, March to June inclusive, this influence can be traced. The 33rd and 91st Regiments, which arrived in 1822, came in detachments from February onwards. Their united strength in March was 884, increasing to 1,116 in May, notwithstanding their losses in the mean time. The 59th and 92nd Regiments, then nearly three years on the station, had a strength of 1,158 in March, increasing to 1,208 in May. The deaths in these two bodies in the next few months were—

	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
33rd and 91st Regiments ..	25	56	55	35	5	4	2	12	11	9
50th and 92nd „ ..	11	7	3	16	19	15	13	13	14	15

The excessive mortality in the 77th, in March and April, 1825, noticed above, when the other four regiments in the island were healthy, supports the same view.

It cannot be supposed that the fever arose on these occasions without a cause, but no information has been handed down to show there was any dif-

* Of 1,000 deaths at Up Park Camp, on the average of sixteen years from 1803 to 1820 (excluding 1819), the numbers in each month ending the 20th were,—

April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March.
26	32	34	43	80	95	156	263	131	75	37	28

Sanitary Report for Army for 1861, p. 406.

ference observed in the various external circumstances usually considered influential in producing this disease, from what they presented in many other years, when no such result followed. The conclusion seems reasonable that the susceptibility of the new-comers rendered them liable to suffer severely from causes not possessing that intensity, at the time, sufficient to induce like results in others whose susceptibility had been diminished by longer residence and a more advanced acclimatization.

The foregoing facts may be expressed shortly as follows:—In the even years there is a slight increase in the mortality from May to July inclusive, but under the diminishing influence of a falling wave there is little farther rise in August, after which it recedes slightly to October, but in November the local causes acquire sufficient intensity to produce a very decided increase; this proceeds to a maximum in December, and then gradually passes into the minimum of March. In the odd years, on the other hand, under the influence of the approaching wave, the rise in August is much developed, and it goes on through September and October, until it culminates in November in a very high maximum, from which, as in the even year, it declines regularly until it attains the minimum in March. When, in addition to these, the element of susceptibility is introduced, the August increase is enormously developed, and in a single month attains a maximum equal to that of November. The influence of the high susceptibility is also traceable in the higher death-rate of April, May, and June in the even year.

It is to be regretted that this analysis of mortality by months cannot be extended to the Windward and Leeward Command. The deaths in each regiment are given in the Reports, by months, on that station, as in Jamaica; but while they amounted to 81·6 per 1,000 of strength, of which 78·5 were accounted for in the Medical Returns, yet, as fevers caused 36·9 only of that number, or rather less than a-half, it would not be safe to consider the total mortality as a fair index of the prevalence of fever, as was done for Jamaica, where they constitute about five-sixths of it. The affections of the stomach and bowels caused a mortality on this station of 20·7 per 1,000, which is four times greater than that from the same class of affections in Jamaica.

In the Statistical Report on the Health of the Troops in Ceylon, the deaths from fever, from 1820 to 1836 inclusive, are given by months for Colombo (p. 28), and the dates of admission of the fatal cases for the same period at Trincomalee (p. 35). The duration of the fatal cases would seem to be about 16 days (p. 13), consequently the numbers for Trincomalee are about half a month earlier than they should be, to conform with those for Colombo. These are as follows:—

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
Colombo	11	10	5	56	13	6	10	4	4	5	5	6
Trincomalee	1	1	2	24	29	14	..	13	5	..	1	4

Thirty-nine of the fatal cases at Colombo, in April, occurred in 1824, in men who had just arrived from the interior, having marched through a wooded country, as the epidemic of that year became prevalent. Though not attributable to that station, however, they serve, with the similar facts for Trincomalee, to show that, though there is a slight febrile period in January and February, by far the most serious one commences in April. In the interior there would seem to be another in August and September.

Of the cases of dysentery which proved fatal at Colombo, Kandy, and Trincomalee, there were admitted each month the following number:—

Stations.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
Colombo	23	18	28	30	32	36	29	28	24	25	28	22
Kandy	8	7	4	11	19	20	8	9	5	18	12	10
Trincomalee	8	9	11	20	20	13	16	17	10	30	14	16

Though this disease seems commoner all the year round, yet the greatest prevalence is during the months of April, May, and June, coincident with that of fever. After a partial diminution in September, there is a considerable increase again in October.

The admissions and deaths for nine years, from 1838 to 1846 inclusive, for the Mediterranean and American stations, are given in a Report on the sickness among the troops serving there in those years. The deaths in most of the cases are too few to give regular curves, though they indicate generally the sickly months. In all the Mediterranean stations fevers commence to increase in June, are most frequent in July and August, from which they decrease, being nearly as frequent in October as in June. Affections of the bowels get more frequent in May, are pretty numerous in June, from which they gradually rise to October, and afterwards fall rapidly to January. The deaths from these affections do not follow quite the same course as in fevers, but, from their greater duration, are more postponed towards the end of the season, as will be obvious from the following summary, including those for the Ionian Islands, Malta, and Gibraltar :—

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
Deaths from Fever..	9	8	13	6	6	7	28	35	27	38	25	19
Affections of Stomach and Bowels.. ..	15	5	4	2	3	6	9	14	28	23	17	15

Of the latter class of diseases, 102 were dysentery or diarrhœa, and 39 chiefly peritonitis and enteritis, but they cannot be separated from the others.

Though the season of sickness in the Mediterranean is indicated generally by the above remarks, it may be well to add further information regarding the plague of Malta, and the epidemics of yellow fever at Gibraltar. The last plague at Malta commenced in April, 1813, and the deaths the following months were—

May.	June.	July.	August.	September.	October.	November.
110	800	1,595	1,042	674	211	53*

The disease thus culminated in July, the period when fevers there are most common ; but it is probable that the attacks were materially diminished after that by the measures adopted to limit its spread.

On the various occasions in the present century that yellow fever has prevailed at Gibraltar, it has attained its greatest force from the middle to the end of October. Cases have been met with as early as the middle of July, but it was not before the end of August, or beginning of September, that it has begun to spread. From October it has gradually diminished, lingering in the severer outbreaks to the end of December, or even a few cases extending into January.†

In Bermuda, in ordinary years, the greatest number of fevers occur in June, July, and August, from which they diminish slowly through September and October. On the occurrence of yellow fever there, however, August is the month when its greatest force is displayed, though it continues to cause great mortality in September. From this, however, it rapidly declines, though cases are met with in November,‡ or even, as on a late occasion, towards the end of December.§

Affections of the stomach and bowels are most frequent from May to August inclusive, during which period they lead to the greatest mortality.

In Nova Scotia and New Brunswick the greatest frequency of fever is from May to September inclusive, and in Canada from June to September. The

* Statistical Report on the Health of Troops in Mediterranean, 1817-36, p. 28*a*.
† Statistical Report on the Health of Troops in Mediterranean, 1817-36, p. 89*a*.
‡ Statistical Reports, Bermuda, 1817-36, p. 7*b*, and 1837-46, p. 177.
§ Lancet, January 21, 1865, p. 71.

deaths from fever in the former are too few to present any decided feature when taken month by month. In Canada they are most frequent in August, September, and October. Out of 187 deaths recorded, 78 occurred in those three months. Affections of the stomach and bowels are prevalent from June to October, both in Nova Scotia and Canada. In the former the deaths from these, in the different months, are too few to form any opinion on. In the latter the greatest mortality coincides nearly with their frequency.*

There are unfortunately no records of the prevalence of a mortality from fever and dysentery in Mauritius, in the different months, in the Report on that station.

The Statistical Reports give the sickness among the troops in Cape Town distinct from those on the frontier, up to 1836. Subsequent to this year the sickness for both portions of the station, and Natal, have been included in the same general Return. There is a nominal record of the casualties in the Principal Medical Officer's office on the station, extending from 1st January, 1825, onwards. From this I have taken the deaths in each month from fever, and from dysentery and diarrhœa, up to 31st December, 1864, a period of 40 years. Keeping those at Cape Town distinct from those at other parts of the station, and arranging them in the odd and even years, and placing the fevers and dysenteric affections for the same years together, they are—

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Year.
Cape Town.													
Odd Years:													
Fevers ..	3	3	5	5	4	4	1	2	3	2	2	4	38
Dysenteric Affections	1	4	2	..	..	..	4	..	1	..	3	1	16
Total	4	7	7	5	4	4	5	2	4	2	5	5	54
Even Years:													
Fevers ..	10	2	2	1	2	1	1	1	2	1	3	1	27
Dysenteric Affections	4	4	1	4	1	2	..	1	3	1	2	4	27
Total	14	6	3	5	3	3	1	2	5	2	5	5	54
Frontier and Natal.													
Odd Years:													
Fevers ..	11	7	9	6	6	4	7	3	4	8	6	7	78
Dysenteric Affections	20	19	12	8	8	14	9	6	7	7	5	11	126
Total	31	26	21	14	14	18	16	9	11	15	11	18	204
Even Years:													
Fevers ..	15	5	7	5	6	10	5	2	3	7	6	6	77
Dysenteric Affections	20	29	25	17	11	7	8	13	4	11	10	16	171
Total	35	34	32	22	17	17	13	15	7	18	16	22	248

The numbers for Cape Town are too few to develope the curve of mortality very satisfactorily; and, small as they are, they present several of those disturbances which have been noticed above in commenting on the deaths in Jamaica. For instance, 3 of the 5 deaths in April of the odd years occurred

* Statistical Reports, Canada, &c., 1837–46, p. 215.

in 1827, 2 of the 4 in June in 1825, while 15 of the 34 deaths in the 20 odd years occurred in 1825 and 1827 alone. These show the existences of causes at that time which have since had their influence much reduced, but they prevent any minute analysis of the facts in the Table. It is obvious, however, that there is a considerable increase of fever in December of the odd years, which is more highly developed in January of the even year. From this period the mortality remains very low until January of the odd year. The higher numbers of March, April, May, and June, are almost entirely owing to the exceptional cases in 1825 and 1827; the remainder is but little different from the even year. It will be observed that coincident with the rise in fever the dysenteric affections became more fatal, and that the loss from these in the first six months of the even year amounts to 16, while in the corresponding period in the odd year it was 7 only; and the deaths from them in the whole even year exceed those in the odd. Many of the fatal attacks, which elsewhere might have taken the form of fever, have here undoubtedly taken that of dysentery or diarrhœa; and if allowance be made for the exceptional cases of 1825 and 1827, the excess of mortality would have been found here in the even year, as may be seen by Table I, it was on the frontier stations about the same period.

The details for the frontier stations show 78 fatal cases of fever in the odd years, against 77 in the even; but, of the dysenteric affections, 126 in the former against 171 in the latter. The strength varied from about 300 in the earlier years to above 7,000 in some of the latter; and the wars of 1835-6, 1846-7, and 1851-2, occurred during the period, in the last two of which, owing to the increased strength and greater exposure, the number of deaths was much increased; still it will be seen that August and September, both in the odd and even years, present the least mortality from fever, while in both January presents the greatest. Combined with the dysenteric affections, December, in both years, shows a distinct increase in mortality, while in each about four-tenths of the whole mortality for the year occurs in January February, and March.

III. *The Connection of the Waves with Terrestrial Magnetism.*

To apply the details wrought out above it is now necessary to examine into the connection of the waves with terrestrial magnetism.

The phenomena of magnetism are usually referred to three elements, viz., first, the deviation of a magnetic needle, moving freely in a horizontal plane, from the meridian, which is called the variation, or declination; second, the deviation of a needle, moving freely in a vertical plane, from the horizontal line, the dip or inclination; and third, the force by which these are produced, which is denominated the magnetic intensity. These elements vary at different points on the earth's surface; but, having been determined at many, these have been marked on maps, and those of similar value joined by lines, constituting the isogonal, isoclinal, or isodynamic lines, respectively. These elements undergo a secular change, varying in rapidity at different places, so that a chart which represented the facts connected with them at a certain epoch, does so sufficiently well for a considerable period, both before and after, yet it becomes sensibly erroneous when it is much prolonged.

On examining these systems of lines, it is found that some of the isogonic curves pass from the southern to the northern hemisphere, across the parallels of latitude, while the course of the others does not agree with the advancing edge of the pandemic waves: they may therefore be set aside for the present. The isodynamic lines coincide with the advancing edge of the waves in some places, but they present too bold a curve to the northward, over the centre of Europe, to indicate the advance of the waves with precision, and elsewhere their accordance is not satisfactory. The isoclinal lines, on the contrary, which encircle the earth at some distance from the magnetic poles, mark out a series of zones, each of which seems to be reached by the advancing wave, at every point in longitude, about the same time, and to be gradually overspread by it in its onward course, leading to outbreaks of disease in that zone, more or less diffused or intense as the circumstances, whether meteorological, local, social, or personal, are favourable or otherwise.

In the "Philosophical Transactions" for 1840 there is a chart of the isoclinal

line by Sabine, embracing the basin of the Atlantic, with the neighbouring portions of Europe and North America, and the west coast of South America. The epoch is 1838. In the second volume of Taylor's "Scientific Memoirs" there is a chart (Pl. xx) of the isoclinal lines for about the same epoch, calculated by Mr. Gauss according to his theory. The lines in the latter correspond very closely with observations over a considerable portion of the globe, but elsewhere deviate from it more or less. In forming the chart attached to this paper, Sabine's lines have been used so far as they go. They have been continued by adopting Gauss's chart, correcting their position by the observations accompanying the paper, and others from some other sources. There may be some errors committed, but they will not be to such an extent as materially to affect the objects here sought for.

In the accompanying chart the isoclinal lines for 70° S., 53° and 30° S., 0°, 30°, 53°, 70°, and 80° N., are inserted. These have been selected as representing, with tolerable accuracy, the position of the advancing edge of a wave on the 1st January each consecutive year. It is possible that, on acquiring more extended information, these positions may require readjustment. If the progress of the wave, from one of these lines to the next, be assumed to be regular, the approximate date of its reaching any station between them can be ascertained by direct measurement on the chart, or it may be deduced from the observed dip at the place. This, as will be found hereafter, is an important point, and it is in the main correct, though it may be somewhat interfered with by those rapid changes in the terrestrial magnetism which take place about the period of the summer solstice in either hemisphere, and the equinoxes.

It is stated above that the magnetic elements undergo a secular change. As regards the dip, the change is, in general terms, as if the isoclinal lines moved gradually to the westward, maintaining their relative position to the parallels of latitude. When their direction is nearly the same, there is little alteration of the dip for many years; but where they are oblique it is much more rapid. London and the Cape present two instances of the latter, where the change is very great, and which may be referred to here, to show how far the adoption of the lines in the chart will apply to the purposes intended in this paper, even in these extreme cases. Graham found the dip at London, in 1723, to be 74° 10′, and Sabine in

1820	70° 3′
1840	69° 12′
1860	68° 20′

Taking the position of the advancing edge of a pandemic wave on the 1st January to be 70° N., the dates on which it would have reached London at these different periods would have been

1723	June 1.
1820	January 1.
1840	December 15.
1860	November 15.

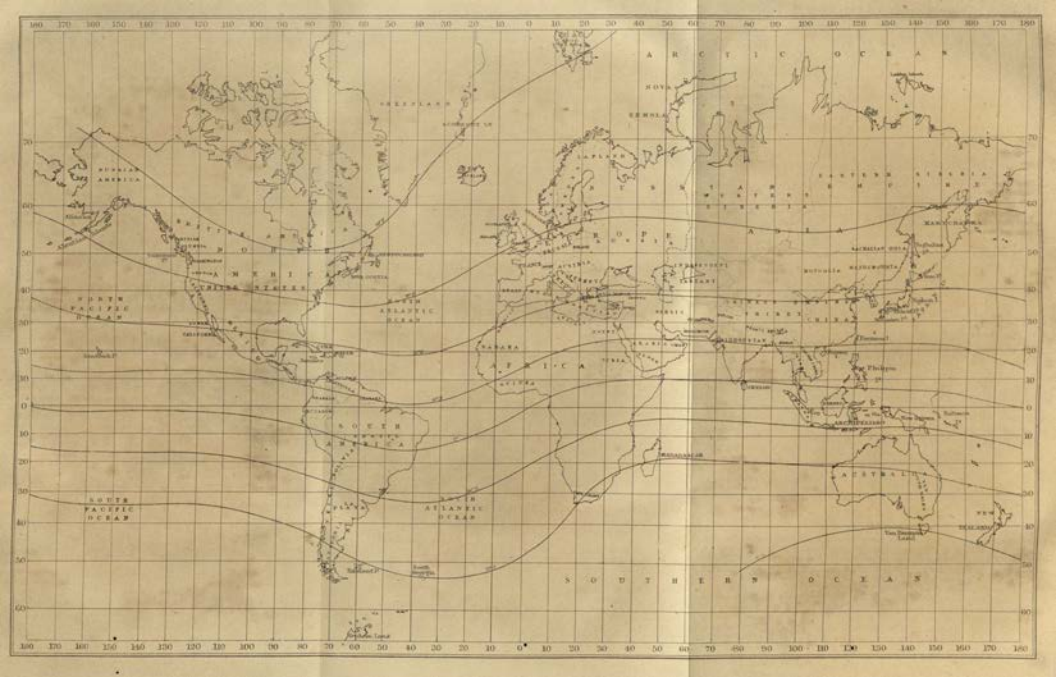
At the Cape of Good Hope the dip was found to be, in

1792	47° 25′
1818	50° 47′
1836	52° 35′
1851	54° 2′

And assuming the edge of the advancing wave to reach 53° S. on 1st January, it would be at Cape Town at each date respectively on April 10, February 10, January 7, and December 18.

So that while at London the date of the arrival of the wave is receding into the previous year with the diminishing dip, at the Cape, in the opposite hemisphere, the same thing is taking place as it increases.

A wave with a two-yearly period, starting from one of these lines at the commencement of, say, the odd year, will be at the next to the northward at the beginning of the even year; and so on, the first part of the wave being met with in the alternate zones in the odd years, and in the intermediate ones in the even. It will be found in each zone too, always in an odd or always in


ARCTIC OCEAN
NOVA ZEMBLA
GREENLAND
RUSSIAN AMERICA
NORTH AMERICA
UNITED STATES
NORTH PACIFIC OCEAN
NORTH ATLANTIC OCEAN
SOUTH AMERICA
SOUTH PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
AFRICA
SAHARA
MADAGASCAR
EUROPE
LAPLAND
RUSSIA
EASTERN SIBERIA
ASIA
MANCHURIA
MONGOLIA
CHINA
INDIA
PERSIA
ARABIA
Philippines
ARCHIPELAGO
AUSTRALIA
NEW ZEALAND
Van Diemens Land
SOUTHERN OCEAN

an even year. The following may be given as the position of the first part of the waves on the 1st January in the respective years :—

Odd Years.	Even Years.
70° S.	53° S.
30°	0°
30° N.	53° N.
70°	80° N.

Sierra Leone is situated in the zone commencing at 30° N.; fevers there present their maximum in the odd years. Jamaica is in the same zone, and gives a similar result. Malta and Gibraltar are in the zone commencing at 53° N.; the excess of fevers at these is in the even years. Nova Scotia and Canada are in the zone commencing at 70° N.; fevers at these present their maximum in the odd years.

There are several stations so situated in their respective zones that the wave does not reach them until a period of the year when the local causes of disease are comparatively quiescent. In such the outbreak does not commence until the season when these regain their activity, which frequently carries it on into the following year. Ceylon affords an instance of this. The wave would reach Colombo about 1st November, Trincomalee about 1st December, in the odd year. By referring to the Table showing the deaths from fever at these stations in the different months, it will be seen that the mortality is nearly at a minimum in those months. At Colombo it increases in January, but does not reach its full amount until April; while at Trincomalee April and May are the sickliest months. Table I shows that the mortality from fevers in the even years in Ceylon is 30·49 per 1,000, while that in the odd is 16·27 only, clearly showing that the wave does not exercise its full influence until combined with activity of the ordinary local causes of disease. From this circumstance arises the apparent anomaly of a station, like Ceylon, placed in a zone which the wave occupies in the odd years, having its excess of mortality in the even years: but the explanation, it will be seen, is quite reasonable.

Mauritius, and the Cape Frontier and Natal, are in a similar position. The first part of the wave would reach these stations about the beginning of December of the odd year. The greatest mortality from fever and dysentery has been shown above to occur in the three first months of the even year on the Cape Frontier; and though there be no facts given, analogy indicates the period following the summer solstice as the season of greatest sickness from these diseases in Mauritius also, and consequently the mortality from each is highest in the even years. Cape Town, up to 1836, the latest year in Table I, was within the zone commencing at 53° S., and should have shown the highest mortality from fever in the even years, on the principles here set forth. Combined with dysentery and diarrhœa, the mortality in both years is about equal; and but for the disturbing causes previously noticed, it is probable that that in the even years would have had a decided preponderance.

Bermuda affords a further illustration of the principle under consideration. That station is so situated in the zone commencing at 53° N., that the wave should reach it about the middle of October of the even year. It has been shown above that, on ordinary occasions, fevers culminate in August, after which they decline. During epidemics of yellow fever, most deaths have occurred in August and September; they are reduced greatly in October, and nearly disappear after November. The wave then reaches the station after the greatest force of the local causes has passed, and their activity is greatly reduced; and, as at Ceylon, Mauritius, and Cape Frontier, the epidemic outbreak should be expected in the following, in this case the odd year. Accordingly it is found that the greater mortality from fevers occur in the odd years, even if that from the same epidemics of 1819 and 1843 be omitted, while the most severe epidemics have occurred in the odd years, such as those of 1819, 1843, and 1853. In October, 1837, there was a slight epidemic, but confined to one island, and to persons communicating with it.* There have been others, however, in even years, though, so far as the information within my reach goes, of a less general or violent character than during the odd. In 1796 yellow fever broke out at Ireland Island, one of the group, but it was seven months, or

* Milroy in British and Foreign Medico-Chirurgical Review, vol. xxxiii, p. 182.

in the following year, that it reached St. George's, the chief one. In 1818 this disease appeared again at Ireland Island, but did not break out at St. George's before August of the following year.* Again there were outbreaks in 1812, 1856, and 1864, the last of which seems the only serious one, and to have developed its full force chiefly on persons recently arrived in the locality from colder countries, and who are less acclimatized than those longer resident.† I have no information as to the time the disease appeared in 1812, or 1856; in 1796 and 1818 it must have been late in the year, which would have brought it within the operation of the first part of the wave. In 1864 there appears to have been fatal cases at St. George's in June, and early in July.‡ It is therefore most likely that this epidemic arose under the latter part of the wave which reached these islands in October, 1862, local circumstances being favourable, as explained above in connection with Jamaica.

There are two exceptions to these principles, doubtless owing to some disturbing cause which I have not been able to detect as yet. These are in the West India Command and the Ionian Islands. The former, situated in the same zone as Sierra Leone to the east, and Jamaica on the west, presents a slightly smaller death-rate from fever in the odd years than in the even. On the other hand, the deaths from dysenteric affections are somewhat greater in the odd years than in the even. The sums of the deaths from both causes are in the odd years 56·41 per 1,000, and in the even 56·27, results which may be considered identical. Single stations of the group, however, show numerous outbreaks in the odd years, corresponding with those at Sierra Leone or Jamaica.

The Ionian Islands are clearly in the same zone with Malta and Gibraltar; and the wave reaches Corfu, the northernmost, about the beginning of February of the even year, early enough to permit of the full effect being developed that year, as at the other Mediterranean stations; yet the excess of mortality from fevers, and from dysenteric affections, between 1817 and 1846, both fell in the odd years. Here, however, as in the West Indies, single stations occasionally display a high rate of mortality in the even year, corresponding with that at Malta or Gibraltar, though, from the small force at them, the actual number of deaths may influence the total for the Command to a slight extent only.

IV. *The Influence of the Waves in exciting Epidemics.*

The influence of these waves in causing outbreaks of disease is manifest in two ways, viz., first, under the operation of the same wave in the same year, at points often very different in latitude, and embracing in longitude, it may be, almost half the circumference of the earth; and, second, in successive years at points more and more to the northward, as the waves pursue their usual course. To illustrate these it is necessary to examine the records of disease at a sufficient number of distinct and widely-spread stations for a series of years, when it will be found that many epidemics, which have hitherto been thought independent of each other, were merely local manifestations of the same general influence, and others which were considered accidental, and to account for which much labour has been expended and ingenuity displayed, fall into these places naturally, as subordinate to the general law.

The investigation may be commenced with the Pali plague, which broke out at Cutch and Guzerat in Hindustan in 1815. As will be seen in the chart, Cutch and Guzerat are situated close to the south of the isoclinal of 30° N., at which, according to the Table given above, the advancing edge of the wave would be found on the 1st January of the odd year. In the course of 1815 the disease broke out in these districts, and caused great mortality. At Sierra Leone, which is in the same zone, there were, according to Dr. Barry, a number of cases of yellow fever this year. At Jamaica, also in the same zone, the mortality among the troops rose to 120 in the thousand, from 94 the previous year. Though the diseases causing this are not specified, it is highly probable, from what has already been said with regard to Jamaica, that fever was the chief. I have no evidence as to the progress of diseases in Egypt or Syria this year. In 1816, when the wave would overspread the Mediterranean north of

* Statistical Reports, 1817-36, Bermuda, p. 7*b*.

† Lancet, October 8, 1864, p. 421. ‡ *Ibid.*

Malta, and much of Europe, the records of sickness among the troops in the former, on which the Statistical Reports are based, had not commenced; but Hennen, in his "Medical Topography," gives some details with regard to the Ionian Islands, from which it appears that, while in the latter half of 1815 the mortality among them was small, in 1816 it increased very greatly, chiefly from fever, which then produced a death-rate of 36·5 per 1,000. Typhus became very prevalent in Italy; and plague, which had for some years previously been common in Albania, spread from Bosnia to Sclavonia and Croatia, besides presenting a number of local outbreaks in Albania itself, as at Arta and Previso; and a minor one at Comitato, a mountain village in Cephalonia. In this island the mortality from remittent fever among the troops, the same year, amounted to the very high ratio of 197 per 1,000; and that among the inhabitants, from the same disease, was unusually great. In the winter 1816-17 a malignant fever, of the nature of typhus apparently, was very prevalent at Algiers. In 1817, the advancing edge of the wave having reached the isoclinal of 70° N., it would in that year overspread Northern Europe, the British Islands, and the American Continent from Cape Hatteras to the isoclinal of 80° N. In this year a very severe epidemic of fever was experienced in Ireland and Scotland, embracing, according to Murchison, both typhus and relapsing fever; while at Newcastle there was an outbreak of pythogenic fever. Cases of relapsing fever had shown themselves, in the end of 1816, in the south of Ireland; but the disease did not become general until 1817. In Nova Scotia and Canada the mortality among the troops, from fever, was 1·8 and 3·2 per 1,000 respectively, declining to 0·0 and 1·8 the following year. The fever in Ireland was accompanied by much dysentery; and in Nova Scotia and Canada the mortality from dysentery and diarrhœa, among the troops, was 4·9 and 3·9 per 1,000 respectively—ratios much higher than any subsequent year in Table II, with one exception.

These facts indicate with precision the regular advance of the wave from the isoclinal of 30° to that of 70° N., and beyond it, over 150° of longitude. As the wave has a two-yearly period, the sickness of the first year is often more or less continued into the second, or other outbreaks may take place at points which had previously escaped, as explained above. Accordingly in 1816 a severe epidemic of remittent fevers, with yellowness of skin, prevailed in the valley of the Ganges from Dinapore to Delhi. The fever of 1816, in Italy, continued into 1817. This year also there was a severe epidemic of yellow fever at New Orleans, Natchez on the Mississippi, and Charleston, and among the troops in the Bahamas Islands. In 1818 there were two cases of yellow fever in Philadelphia, according to La Roche.

The wave next following that just examined, can be traced from the Cape of Good Hope. From old Returns available here, the mortality from fever among the troops at Cape Town, in 1813, was 0·2 per 1,000, and in 1814 it rose to 0·9. This station was then slightly to the north of the isoclinal 53° S., and consequently experienced the advancing wave early in the even year. The next indication is at Ascension, which being just to the north of the isoclinal 0°, also comes under the first part of the wave in the same year. Here, according to the Returns given by Burnett in his account of the fever in the Bann, there were four admissions from fever in 1816, against two only the following year. The numbers are small, it is true, but, so far as they go, they indicate the operation of the general influence. In May, 1817, Copland mentions having met with several cases of yellow fever among seamen at Sierra Leone,* the next zone to the northward of that including Ascension. This year also the mortality among the troops, from all causes, in the West India Islands, which in 1816 had amounted to 151 per 1,000, increased to 162·1, of which 59·4 was from fever, and 65·4 from bowel complaints. In Jamaica there was rather less mortality than in 1816. The Pali plague in Cutch and Guzerat seems to have been more prevalent in 1817 than in the previous year. In 1818 the wave is to be looked for to the north of the isoclinal of 53° N., and its operation is indicated by a mortality from fever at Malta of 5·6 per 1,000, three and a half times greater than the previous year, At Gibraltar the ratio was 5·8 per 1,000, which, though from want of Returns for 1817 cannot be compared with it, is

* Dictionary, art. "Pestilence Hœmagastric," § 143.

higher than in any other year in Table II, except 1828. One case at this station, this year, was returned as yellow fever. In the Ionian Islands the death-rate was lower than in 1817. Petechial fever continued rife in Northern Italy in 1818, and plague ravaged Morocco. Bermuda, which is in the northern part of the same zone as those countries, showed a high death-rate from fever this year, when the yellow fever appeared at Ireland Island late in the season, and the following year became developed into a desolating epidemic. In 1819, the wave passing the isoclinal of 70° N., there was a death-rate of 2·9 per 1,000 among the troops in Nova Scotia, while that of the previous year in Canada was maintained. Yellow fever appeared epidemically also in Baltimore, Philadelphia, New York, and Boston. Typhus and relapsing fever continued in Ireland and Scotland, though the epidemic force was much reduced. In this year too, bilious fever prevailed in Iceland, but there is not sufficient information regarding the season at which it appeared to admit of its being referred to this or the preceding wave.

As with the previous wave, various epidemics were experienced in the second year of that under consideration. In the Mediterranean, plague was severe at Constantinople in 1819. The mortality from fever was higher among the troops in the Ionian Islands than in 1818, though less in Malta and Gibraltar; and yellow fever, an isolated case of which was seen at the latter the previous year, had become developed to the dimensions of an epidemic at Cadiz, Xeres, Malaga, and other places in the south of Spain. The severe epidemic at Bermuda in 1819 was accompanied by similar outbreaks at New Orleans, Natchez, Mobile, Charleston, and the Bahamas.

The wave next in order would have been experienced at the Cape of Good Hope in 1816, but there are no returns for that year available. Its first indications are met with in Ceylon in 1818, where the mortality from remittent fever, chiefly among the troops, rose to 133·8 and that from dysentery and diarrhœa to 55·5 per 1,000—the former about four and a half times the previous year's ratio, and the latter two and a half times more. Ascension, as stated above, experiences the advancing wave in the early part of the even year; and fever occurs in the same year as at Ceylon. In 1818 the admissions from this disease there were 12, or six times more than in 1817, and embracing nearly every man on the island; and one death occurred, the symptoms, according to Burnett, being those of yellow fever. St. Helena is to the south-east of Ascension, so situated in the zone, between the isoclinals 30° S. and 0°, that the wave would reach it about 1st June of the odd year, later in the season than the usual period for sickness in the southern hemisphere; consequently, on the principles already announced, fevers there should be looked for then in the next warm season. There were no returns of the sickness among the troops at this station in 1817; but in 1818 the deaths from fever amounted to 6·0 in the 1,000, being more than four times the ratio of 1819. In the latter year one case was returned as yellow fever. At Lima, in Peru, a large body of Spanish troops from Europe was assembled, among whom a severe epidemic of fever, supposed to have been yellow, broke out in February, 1818.* Lima, like Ceylon and St. Helena, lies in the zone to the south of the isoclinal 0°, and would be reached by the advancing edge of the wave about 1st November of the odd year, though, as the active period of the local causes commences about January, fever due to their influence would not assume the epidemic form before that month in the even one. The disease was not confined to Lima, but was met with as far south as Ica, in lat. 14° S. In 1819, this wave, extending from Ceylon to Peru, would overspread the next zone to the north. Accordingly a terrible epidemic occurred in Jamaica; and though the total mortality from fever in the West India Command was less than in 1818, yet at several of the stations it was high; and at Demerara, where the form of fever for years previously had been the ordinary remittent, yellow fever appeared and proved very fatal. In 1819, also, Pali plague was very severe in Cutch and Guzerat; and true plague was epidemic at Susa in the south part of the Mediterranean. In 1820, with the next zone to the north, the mortality from fever in the Ionian Islands was very low; but at Malta the ratio remained pretty high, while at Gibraltar it increased; and in

* Smith, British and Foreign Medico-Chirurgical Review, vol. xxxv, p. 210.

the neighbouring parts of Andalusia yellow fever prevailed epidemically, and typhus was severe in the convict hulks at Toulon. Bermuda was low, but at New Orleans the millesimal ratio of deaths from yellow fever was nearly as great as the previous year. The wave would reach New Orleans about the middle of May, while the period for the occurrence of yellow fever there commences in July, hence the epidemic of this year must be attributed to the wave under consideration. In 1821 the mortality at Bermuda was high. There was no death from fever among the troops in Nova Scotia, but in Canada the ratio was 2·8 per 1,000, as against 0·6 in 1820; and at Norfolk, Virginia, and Baltimore, yellow fever showed itself. In 1820 and 1821, croup and catarrhal fever were prevalent in Iceland. In 1821, the second year of the wave in the western part of the Mediterranean, there was a severe epidemic of yellow fever at Barcelona, while it continued at other points; and fever among the troops in the Ionian Islands caused a high mortality. In like manner, in 1822, yellow fever was seen at New York; and at Halifax the millesimal ratio of the deaths among the troops was 1·9.

The next wave to be considered would be experienced at Mauritius and the Cape in 1818. At Mauritius there was a mortality from fever of 1·1 per 1,000; but from dysentery and diarrhœa of 10·7, as against 1·2 and 7·9 respectively the following year. At Cape Town there was no death from fever in 1818, and only a ratio of 1·5 from bowel complaints, but 2·5 and 1·7 respectively in 1819. In 1820, when this wave would be experienced in Ceylon, fever and bowel complaints were comparatively low. At St. Helena, however, the former were nearly twice as numerous as in the previous year, while one case was returned as yellow fever, and the following year there was another. In 1821 the Pali plague was still prevailing in Cutch and Guzerat. The deaths from fever, both in the West India Command and Jamaica, were very high, though less in each than in 1820, but those from dysentery and diarrhœa were augmented. The following year, however, the mortality from fever in Jamaica was very high, due in some degree to the arrival of fresh troops from Europe, as previously mentioned. In 1822, the wave proceeding from 53° N., the mortality at Malta was 6·2 per 1,000. At Gibraltar and the Ionian Islands it was less than in the previous year, but at the former one case was designated yellow fever, and this form of disease continued at Barcelona. At New Orleans there was an epidemic of yellow fever experienced, which caused a higher death-rate than that of 1817. In Bermuda the rate among the troops was low in 1822, but in 1823 again high, while both Nova Scotia and Canada, in the latter year, had high death-rates. In London, Cork, and Dublin also, in 1823, fever became more frequent, as indicated by the admissions to the fever hospitals in these places; and the following year they increased considerably in London and Dublin, and also in Edinburgh and Glasgow.

In 1820, at Mauritius, there were indications of the next wave, which, like that of 1818, produced a mortality from fever of 0·7 per 1,000 only, rather less than that of the preceding year, but one from dysentery and diarrhœa of 12·9 higher than that of 1818 or 1819. At Cape Town the ratio of 2·5 from fever continued, and that from bowel affections was also much the same. In 1821, as will be seen by Table II, the aggregate mortality from these classes of disease was considerably diminished at both stations. In 1822, when this wave would be experienced at Ceylon, there was a large increase of mortality from fever there, and that from affections of the bowels also increased materially. The returns for St. Helena were not available for this year. At Ascension, from 26th November, 1821, to 7th May, 1823, three cases only of fever came under treatment. In 1823 the wave entered the zone commencing at the isoclinal of 30? N., and yellow fever appeared at Sierra Leone as a very severe epidemic; and at least one case of this form of the disease seems to have proved fatal to a European at Bathurst on the Gambia.* Both in the West India Command and Jamaica, fever and bowel complaints were comparatively low in 1823; but fever caused considerable mortality among the few white troops at Belize. In 1823, also, yellow fever broke out at Ascension on 11th

* This information I received from an officer of the Commissariat, who was at Bathurst at the time, and who stated distinctly that the patient was yellow, and had black vomit previous to death.

May, 18 days after the arrival of the "Baun" from Sierra Leone, with the disease on board, and cut off 21 out of 52 persons residing on the island. The disease appeared on this occasion at the same season as it had done in 1818, and after some rain had fallen. In 1824 the wave would proceed from the isoclinal of 53° N. The ratio of mortality from fever in the Ionian Islands remained as high as in the previous year, while those for Gibraltar and Malta, and those for dysentery and diarrhœa at these stations, were very much augmented. Plague became epidemic at Cairo in 1824, and carried off 30,000 persons. Cairo is in the zone between the isoclinal 30° and 53° N., and would be reached by the wave about 1st June in the odd year; but, as is well known, plague commences in Egypt in December, and loses its epidemic form in June; and by St. John's day, the 21st of that month, is usually considered to have ceased. In conformity with what has been shown above to be the course of disease in places similarly situated, the epidemic outbreak of plague could not be expected at Cairo before the next sickly period, which would throw it into the following or even year, as in this instance. Plague was also in the Morea in 1824. There was a severe epidemic in the district of Dulcigno on the Montenegro coast. It was also prevalent at Constantinople and Erzeroum. At Bermuda the ratio of deaths from fever remained as high as in 1823, and that from dysentery and diarrhœa quadrupled the previous year's rate. At the Bahamas, where the troops had suffered very severely in 1823, the loss from fever this year was still high. At New Orleans there was a slight epidemic of yellow fever, and the disease was met with also at Charleston. In 1825 the wave would pass the isoclinal of 70° N.; and this year the millesimal ratio of mortality from fever at Nova Scotia rose from 0·5 in the previous one to 1·8, and in Canada from 2·3 to 4·3, and the ratios of deaths from bowel affections were 0·9 and 0·7 respectively, against none in 1824. The admissions into the fever hospitals in London, Cork, Edinburgh, and Glasgow, all showed a considerable increase in 1825. Dysentery was also prevalent in some parts of Ireland and of France, as it had been the previous year in the Mediterranean and Bermuda, and was this one in Nova Scotia and Canada. As already noticed, sometimes epidemics appeared in various places in the second year of the wave: thus in Lower Egypt, in 1825, plague was rife; and at New Orleans there was a death-rate from yellow fever nearly equal to that in 1824. There was also an epidemic at Natchez. Hennen reported a case of yellow fever in Gibraltar in 1825.* In 1826, fever, chiefly relapsing and typhus, increased in Great Britain and Ireland, especially in the latter. Graves, in his "Clinical Lectures" indeed, noticed that many cases resembled yellow fever in presenting yellowness of skin and black vomit. This year also remittent fever was very prevalent in Holland, along the coast of the North Sea, with yellowness of surface. At Norfolk in Virginia there was an epidemic of yellow fever, and at Philadelphia a few cases.

The wave following that just described was observed at the Cape in 1822. At Cape Town the millesimal ratio of deaths from fever was 2·5, as against 0·0 the previous year, and that from dysentery and diarrhœa 6·5, against 2·5 in 1821. On the Cape Frontier, the returns for which are available this year for the first time, the ratio from fever was 4·8, and from bowel affections 3·2. The following year there were 1·7 and 0·0 respectively. At Mauritius there was no death from fever in 1822; and though bowel complaints caused considerable mortality, the ratio was less than in 1821, and very little higher than in 18 3. In 1824 the wave would have reached the isoclinal 0°; and in Ceylon the ratio per 1,000 of mortality from fever was five times higher than in the previous year, and that from dysentery and diarrhœa more than doubled. The first Burmese war commenced this year; and the troops in the field, in various parts of that territory, suffered very severely from fever and dysentery. That form of fever called "dengen" appeared in the Burmese expedition, and at the same time there were cases in Calcutta. The Ashantee war was then going on in the vicinity of Cape Coast Castle, which, as will be seen in the chart, is in the same zone as the Burmese territory; and here also there was excessive mortality from fever and dysentery. Some of the men-of-war employed on the stations sent part of their crews on shore for some time at Cape Coast, who

* Medical Topography, p. 119.

suffered from fever and dysentery. In a fatal case of fever in Huis Victor, coffee-ground fluid was found in the stomach. The exact date is not given, nor the ship's position at the time, but it seems probable she was in this neighbourhood, and the case occurred between June, 1824, and 1st March, 1825. In 1825 the wave reached the isoclinal 60° N. The fever continued among the troops in Burmah, and the dengen spread along the valley of the Ganges for some distance. This year a considerable force of white troops were sent to Sierra Leone and the Gambia, among whom there was immense mortality from remittent fever. In the West India Command the millesimal ratio of deaths from fever was slightly lower than the preceding year, though that from dysentery and diarrhœa was doubled; but in Jamaica there was a very severe epidemic of fever, also with an increase of mortality from bowel complaints. In 1826 the mortality at Sierra Leone continued unabated. In the West India Command it was somewhat less, though greatly reduced in Jamaica, but there was a high death-rate at Belize. The wave would enter the zone to the north of the isoclinal 53° N. in 1826. In the Ionian Islands the death-rate from fever increased considerably. At Malta it remained the same; but at Gibraltar there was an increase, though with a considerable diminution of that from bowel complaints. Hennen reports several cases of yellow fever there this year.* Plague was prevalent at Constantinople. The ratio of deaths from fever was 1·6 only at Bermuda. There was no yellow fever at New Orleans, but a high mortality from it among the troops in the Bahamas. In 1827 the ratio at Bermuda rose to 4·5, and there was a slight outbreak of yellow fever at New Orleans and Charleston. In 1827 the wave would proceed from the isoclinal 70° N. The ratio per 1,000 of deaths from fever at Nova Scotia rose to 2·7 from 0·9 in 1826, and in Canada to 4·6 from 3·2. The admissions into the Fever Hospital in London were slightly increased over 1826, and those in Glasgow and Edinburgh a good deal. In Cork they were quite as numerous as in 1826, but less so in Dublin. In the marshy districts in the south of England, this year, fevers often assumed a remittent form, and were of a violent unmanageable nature, like those in the tropics. In 1828 typhus fever prevailed in Ireland, and continued into the following year. The fever in Ireland had decreased considerably in 1828, but the admissions at Glasgow and Edinburgh were more numerous than in 1827. In this year, the second of the wave in that locality, the plague broke out at Odessa.

The next wave to be traced is that starting from the isoclinal 53° S. in 1824. At Mauritius, this year, the ratio of deaths from fever remained the same as the preceding one; but there was a considerable increase in that for dysentery and diarrhœa, which diminished a half next year. On the Cape Frontier there was no death from fever, but a ratio of 2·1 from bowel complaints, which increased to 8·6 in 1825. At Cape Town the deaths from fever doubled in 1824, while those from bowel complaints diminished, but the following year both increased very much. In 1826 the wave would be in operation in the zone commencing at the isoclinal 0°. That year fever in Ceylon was slight, though bowel complaints were pretty numerous, and the death-rate from them considerable; the following year both were increased. In 1826 there was a death-rate of 2·2 per 1,000 from fever among the civil population in St. Helena, which was nearly equal to that of three subsequent years, consequently very high. This rate, however, was continued into 1827. There is no information regarding Ascension this year, and the men-of-war on the coast of Africa seem to have had very little sickness. In 1827 the wave would pass the isoclinal 30° N. At Sierra Leone this year the mortality among the troops from fever was not quite one-sixth of what it had been in the two preceding years, though still very high. In the West India Command fever proved nearly twice as fatal as in 1826, and in Jamaica a very severe epidemic occurred. At Belize there was also a high death-rate. The dengen or dandy-fever, and yellow fever, appeared at St. Thomas in the West Indies in 1827, and affected a number of the other islands as well. In 1828 the wave would proceed into the zone beyond the isoclinal 53° N. Fever, which in 1827 was high in the Ionian Islands, was this year considerably higher, and the mortality

* Medical Topography, p. 119.

from affections of the bowels was also greater. In Santa Mama, one of these islands, the millesimal ratio of deaths from fever alone was 149·7. In Malta the ratios from both fever and bowel complaints were higher than in 1827, and at Gibraltar there was a very severe epidemic of yellow fever. During these occurrences in the military stations in the Mediterranean, the neighbouring countries displayed much febrile disease. Plague raged in Egypt, Syria, Greece, at Constantinople, in the Russian army in the Danubian provinces, at Bucharest, and Cronstadt in Transylvania. Petechial typhus was epidemic at Naples. At the Bahamas there was considerable mortality among the troops. At New Orleans a slight epidemic of yellow fever. The dengen was prevalent this year at New Orleans, and at the towns in the Southern States of America. In 1829 the plague continued in Egypt, Greece, and Syria; and was experienced at Odessa. In the west, yellow fever prevailed extensively at New Orleans. The wave would occupy the zone beyond the isoclinal 70° N. in 1829. Fever at this time seems to have been declining all over the British Islands. In Nova Scotia the millesimal ratio of deaths rose to 2·6 from 0·5 the previous year; in Canada it was less by half.

The wave following that last described would be at the isoclinal 53° S. at the beginning of 1826. This year, at Mauritius, the millesimal ratios of deaths from fever, and dysentery and diarrhœa, were 3·0 and 6·7 respectively, both showing considerable advances on those for the previous year. On the Cape Frontier there was a considerable ratio from fever, though none from affections of the bowels. In Cape Town the ratio of deaths from fever was low this year. In 1827, however, it increased very much, when those on the frontier and at Mauritius had fallen. In 1828, when Ceylon would be under the influence of this wave, there was less mortality there from fever and bowel complaints than in the previous year. The returns are not available for St. Helena this year. An attempt was made at this time to form a settlement at Fernando Po, which, as will be seen by the chart, lies close to the isoclinal 0°, in the Bight of Biafra on the coast of Africa. Out of 25 marines landed here in 1827, all, except one, had fever in the course of the following year, and eight died.* Of 30 mechanics who arrived in November, 1827, all had suffered. There was no record of the deaths. A few were invalided, and five only remained in June, 1828.† In 1829 the wave would pass the isoclinal of 30° N.; and this year there was a severe outbreak of yellow fever at Sierra Leone, and the same form of disease prevailed in several of the men-of-war on the coast of Africa, and was experienced this year also at Fernando Po, among the marines and mechanics who arrived in June, and among the vessels engaged in the palm-oil trade in the rivers on the opposite coast.‡ As had occurred in 1823, when yellow fever was prevailing at Sierra Leone last, the mortality from fever this year was small, comparatively speaking, both in the West India Command and Jamaica. In 1830 yellow fever seems to have been epidemic at Goree and St. Louis on the Senegal. The advancing wave would cross the isoclinal 53° N. in 1830, and in the Ionian Islands fever caused about the same mortality as the previous year, while that from bowel complaints was less. At Malta the ratios from both fevers and bowel complaints were much increased; at Gibraltar there was a slight increase in both. Plague prevailed this year along the course of the Euphrates, from Bassorah to Aleppo, and in Egypt and Syria. Petechial typhus was common in Naples, and severe typhus in the convict hulks at Toulon. In the western hemisphere there was a slight epidemic of yellow fever at New Orleans; while in both the West India Command and Jamaica, as in 1824, the mortality from fever was considerably increased. The wave would pass into the zone beyond the isoclinal 70° N. in 1831; and at Nova Scotia the millesimal ratio of deaths from fever rose to 6·5 from 0·4 in 1830. In Canada it remained the same, but increased the following year. In 1831 typhus became very prevalent in London, Glasgow, and Edinburgh; and the number of admissions into the fever hospitals in Cork and Dublin was

* Bryson, Climate and Diseases of African Stations, pp. 60, 61.

† *Ibid.* pp. 69, 70.

‡ Bryson, Account of Origin, Spread, and Nature of Epidemic Fever of Sierra Leone, p. 60.

increased. The disease seemed less in London in 1832; but in Ireland, and still more in Scotland, the attacks were more numerous, as in Canada.

The next wave in succession would pass the isoclinal 53° S. in the beginning of 1828. At Mauritius this year the millesimal ratio of mortality from fever reached 7·3, and that from affections of the bowels 17·7. On the Cape Frontier these were 5·6 from each class, and at Cape Town 5·2 from fevers, with none from the dysenteric affections. In 1830 the wave would pass the isoclinal 0°. In Ceylon this year there was little increase of mortality from fever over the preceding year, and that from affections of the bowels was slightly diminished. At Fernando Po the fever met with at the end of 1829 was of a milder type than in the earlier part of the year, and seldom proved fatal. In the summer of 1830, however, it resumed its work of destruction in a more malignant form. The greatest mortality occurred in a party which arrived from St. Helena in April. It consisted of men, women, and children, amounting in all to fourteen, of whom there were only two remaining alive by the end of July.* In 1831, when the wave would pass into the next zone, there is no account from Sierra Leone. The mortality from fevers and affections of the bowels in the West India Command was somewhat higher than the previous year, and in Jamaica there was a severe epidemic of the former. In 1832 the wave would proceed beyond the isoclinal 53° N. The mortality at all the Mediterranean stations from fevers diminished from the previous year, and in the Ionian Islands only was there an increase of that from affections of the bowels. At New Orleans there was a moderate outbreak of yellow fever, which the following year, however, became developed into a severe one. There was a severe epidemic of plague at Bassorah, Bagdad, and Mecca, this year. The wave would pass the isoclinal 70° N. in 1833. In Nova Scotia and Canada fever produced little mortality this year, but in 1834 the ratios increased in both. In Vancouver's Island, on the west coast of America, intermittent and remittent fevers were unusually prevalent in 1833, owing, it was supposed at the time, to the extensive breaking up of land for agricultural purposes. The island, it will be seen, is in the same zone as Canada, and would be under the influence of the same wave. The admissions into the fever hospitals in London, Cork, Dublin, Glasgow, and Edinburgh, were all diminished in 1833, though in 1834 the numbers increased a little at all except Edinburgh. The latter year fevers seem to have been common in Ireland, extending into 1835.

The next wave to be investigated would be at the isoclinal 53° S. on 1st January, 1830. At Mauritius the ratio of deaths from fever increased, though that yeat dysenteric affections diminished. On the Cape Frontier there was a ratio of 1·7 from fever, against 0·0 in 1829, and at Cape Town of 0·9 against 0·0. The latter increased in 1831 to 1·7, with a similar ratio from dysentery and diarrhœa. In 1832, when the wave would pass beyond the isoclinal 0°, there was a considerable increase of deaths from fever and bowel complaints at Ceylon. In 1833 there was a very severe remittent prevailing at Calcutta. In the West India Command fever caused a slightly increased mortality over the previous year. At Jamaica it had gone on diminishing from 1831, though still amounting to 61·1 per 1,000. In 1834 the wave would extend into the zone beyond the isoclinal 53° N. This year there was a slight increase of mortality from fever in the Ionian Islands, but a diminution in that from affections of the bowels. At Malta the deaths from fever were more than trebled, and those from dysentery, &c., doubled, while at Gibraltar the ratios from both were materially increased. Plague prevailed in 1834 at Alexandria, Tripoli, and Constantinople, and a fever denominated "pernicious" at Athens, which continued into the following year, as the plague also did in Lower Egypt in a very severe form. In 1834 there was a low ratio from yellow fever at New Orleans, and from fever generally at Bermuda. In 1835 the wave would pass into the next zone beyond 70° N. The deaths from fever were less in Nova Scotia this year, but in Canada maintained the previous rate, and typhus was prevalent at Philadelphia. In the British Islands there was an increase in the admissions in the Fever Hospitals in Cork, Dublin, and Edin-

* Bryson, Account of Origin, Spread, and Nature of Epidemic Fever of Sierra Leone, p. 49.

burgh, which was augmented still more the following year in Cork, Dublin, and Glasgow. The Cavalry and Infantry on the home station showed a considerable increase of mortality from fever in 1835, which was increased the following year in the Foot Guards and Infantry, though the ratio of the Cavalry was rather less. In 1836 typhus was prevalent in Ireland.

Another wave would leave the isoclinal 53° S. early in 1832. At Mauritius the ratio of deaths from fever was 1·6, against 0·0 in 1831, but that from dysenteric affections was less. There was no death from fever on the Cape Frontier. At Cape Town the ratio from fever was about half that of the previous year, but that from dysentery and diarrhœa was doubled. In 1834, when this wave would pass the isoclinal 0°, the mortality from fever and bowel complaints was low at Ceylon, though the following year they were both augmented. In 1835, when the wave would pass the isoclinal 30° N., there does not appear to have been much fever at Sierra Leone; but one case of yellow fever occurred, which terminated fatally with black vomit on 4th September. There was a considerable increase in the ratio of deaths from fever in the West India Command, though in Jamaica it was slightly lower. In 1836, with the wave advancing beyond 53° N., the deaths in the Ionian Islands remained low for that station. In Malta both fever and bowel complaints caused considerably increased mortality. At Gibraltar the deaths from fever increased, but those from bowel affections were less. There was a severe epidemic of plague this year at Constantinople. It was also experienced in Bulgaria. Sophia lost one-third of its inhabitants, and Schumla was affected; and it prevailed at Galatz, Ibraila, Silistria, Bucharest, and along the Danube, this and the following year. Salonica had a few sporadic cases in 1836, but in 1837 a violent outbreak. The disease was also at Smyrna in 1836 and 1837; and the latter year throughout Asia Minor, Syria, Lower Egypt, and coast of Barbary. The millesimal ratio of deaths from fever in the Ionian Islands rose to 12·1 in 1837, almost four times that of 1836. The Pali plague reappeared in Marwar in 1836; and fever with yellowness of skin was very prevalent among prisoners in gaols, and the poorer classes in the native villages, in the Upper Doab, Rohelcund, and Delhi districts. In 1836 the millesimal ratio of deaths from fever at Bermuda was 1·5, as against 0·0 in 1835, and that from dysentery and diarrhœa 7·7, as against 1·5. At New Orleans there was no yellow fever. In 1837, at Bermuda, the mortality from fever rose to 4·8 per 1,000; and the yellow fever appeared in one of the islands, but was confined to it. At New Orleans this year there was a severe epidemic of that form of the disease, and it prevailed extensively in Cuba. In 1837 the wave would pass into the zone beyond the isoclinal 70° N. The ratio of deaths per 1,000 from fever at Nova Scotia, rose from 0·5 in 1836 to 3·0. In Canada too there was an increase, though to a less extent. In Great Britain and Ireland typhus became remarkably prevalent this year, and continued into the following one, but with diminishing intensity, except in Edinburgh. The Foot Guards and Cavalry on the home station showed a considerable increase of mortality from fever in 1837. The Infantry also had a high rate, though less than in 1836; but as in 1837, for the first time, the whole of the Infantry serving at home were brought into the returns, while up to 1836 inclusive the depôts of regiments serving in the West Indies only were included, it is possible the result may have been affected thereby. In 1838, however, the mortality of all that description of force was considerably less. In 1838, from March to the end of June, intermittent fever prevailed to a very unusual degree for 40 or 50 miles along the Angerman river in Sweden. Typhus and jaundice were very frequent in Iceland; and in America, in the Mauriac basin, at the south-west angle of Lake Erie, there was a very severe epidemic of autumnal fever with yellowness of skin, closely resembling the yellow form of the disease.

The wave following the above would pass the isoclinal 53° S. in the beginning of 1834. At Mauritius the mortality from fever remained high, as in 1833, and that from dysentery and diarrhœa increased somewhat. There was no return for the Cape Frontier this year. There was no death at Cape Town from fever, but the following year a considerable mortality for that station. In 1836, when the wave would pass into the zone north of the isoclinal 0°, Ceylon showed a lower mortality from fever, as well as from affections of the bowels, than the previous year; and in 1837 that from fever diminished in

much greater proportion. There are no records available for the portion of this zone on the Atlantic coasts this year. In 1837 the wave would pass the isoclinal 30° N. This year the plague was very severe in the districts of Marwar, Meywar, and Ajmer; and there were much intermittent and remittent fever in Upper India, and the fever with yellowness to the eastern parts of the country. Yellow fever, of which the probable approach had been foreshadowed by a single case in 1835, broke out at Sierra Leone as a very severe epidemic in April. In July it appeared at the Gambia, and in August and September at Goree. In April too it commenced at George Town, Demerara, on the west coast of the Atlantic; and was experienced severely in Barbadoes, Martinique, Dominica, and Jamaica. In 1838 the wave would pass into the next zone beyond the isoclinal 53° N. The mortality this year, both from fever and bowel complaints, was very low in the Ionian Islands and Malta; but at Gibraltar the ratios from these rose from 0·9 and 0·9 in 1837 to 4·7 and 2·4 respectively. In Bermuda there was no death from fever among the troops, and at New Orleans none from yellow fever. The last epidemic of plague which occurred in Constantinople took place in 1838. The wave would pass into the zone beyond the isoclinal 70° N. in 1839. The ratios of mortality declined considerably this year at Nova Scotia, but in Canada they were but little diminished. In England and Scotland, in 1839, there was less fever than the previous year; but the Fever Hospitals in Cork and Dublin showed an increase of about a fourth on the admissions of 1838. In 1840, throughout England, the deaths from fever, according to the Registrar-General's returns, were 1·12 per 1,000, having been 1·04 only in 1839; and at Cork and Glasgow fever seems to have been more frequent also. The returns among the troops are to the same effect. All showed a diminution in 1830, but in 1840 the Foot Guards and Infantry both had a great increase.

The next wave would leave the isoclinal 53° S. on 1st January, 1836. At Mauritius this year, while the mortality from affections of the bowels retained almost its previous rate, the ratio of deaths from fever was 2·6 against 0·0 in 1835. At the Cape the ratios were 1·3 and 1·3 respectively, against 3·4 from fever in 1835, with none from affections of the bowels. The wave would pass the isoclinal 0° in the beginning of 1838. The deaths per 1,000 among the troops in Ceylon, from fever, in 1837-8-9, were 0·9, 0·9, and 1·0 respectively; all very low, and showing no prevalence of this disease. At Ascension this year there was a severe outbreak of yellow fever. The disease commenced in the end of March, after heavy rains on the 16th and 17th of that month, preceded by some years of dry weather. The wave under consideration would reach Ascension early in January, consequently the island would be fully under its influence in the end of March, when the ground began to dry after the heavy rain, and malaria to be evolved under the action of a nearly vertical sun. In the year ending 31st March, 1839, the mortality from fever among the officers of the army, at Sierra Leone and the Gambia, was in the ratio of 3·5 per 1,000 of mean strength; and in that ending 31st March, 1840, and consequently embracing the sickly period of 1839, the rate rose to 102 per 1,000. In the West India Command, in 1839, fever seems to have been less prevalent than in 1837 and 1838, though still frequent; but in Jamaica the ratio of deaths per 1,000, which in 1838 was 22·4, rose to 44·3. The wave would pass beyond the isoclinal 53° N. in 1840. In the Ionian Islands the mortality from fever of the previous year was slightly increased, and that from bowel complaints to a less extent. At Malta the ratios from both were diminished; but at Gibraltar that from fever rose to 2·0 from 0·0 in 1839, and that from bowel complaints to 1·2 from 0·7. At Alexandria, in 1839, there were 19 deaths only from plague; in 1840 these rose to 679. These facts show the existence and passage of the wave to the northward in the usual manner.

It is needless to go further into the detailed examination of these waves. Those traced above are sufficient to show that their progress is regular, and that the two-yearly period, with the limits assigned to them each year by the isoclinals so frequently mentioned, represent the results obtained from so many points with a degree of accuracy that could scarcely have been anticipated. Though the detailed examination has embraced little more than twenty years, yet as the succession of waves evidently depends on some general influence connected with terrestrial magnetism, there can be no hesitation in

applying the principles developed above to the explanation of the epidemics which have excited much discussion among the members of the medical profession, and which are as yet involved in obscurity, provided they occurred at periods not so far removed from 1838, the date to which the isoclinals in the chart are brought up, as to introduce material error, and to render these inapplicable. It may be well to notice some of these.

In 1843 there was a very severe outbreak of yellow fever at Bermuda. Retracing the wave backwards, it is found it was in operation in the West Indies in 1841. From the data given by Blair (see Table II), it appears that in 1840 the millesimal ratio of deaths among the white seamen at George Town, Demerara, from yellow fever, was 15·6; in 1841 this rose to 32·5, and the following year continued at 32·1, after which it declined to 5·8. In 1841, in Barbadoes, where I then was serving, there was a considerable mortality among the troops, from the same disease, towards the end of the year; and at Dominica a detachment of the 92nd Regiment suffered so severely from it that it was withdrawn. This year too a battalion of the 60th Rifles went from the Ionian Islands to Jamaica, where it suffered very severely, the millesimal ratio of deaths from fever among the troops there, which in 1840 was 52·1, having risen in 1841 to 352·9. In 1842, at Bermuda, there was a ratio of deaths from fever of 6·0 among the troops, as against 3·4 in 1841, showing the disposition to a more severe description of fever, as in 1818; and in 1843 this was magnified into a very fatal epidemic, causing a mortality of 121·6 per 1,000, a course exactly parallel to that which had occurred 24 years before. There was very little yellow fever at New Orleans in 1843, but at Charleston, Mobile, and Vicksburg on the Mississippi, the disease was very prevalent.

In 1845 the sickness broke out in the "Eclair" on the coast of Africa, which has since led to so much controversy. One argument strongly insisted on by those who maintained that the epidemic which appeared at Bona Vista that year arose from the communication with her crew labouring under yellow fever, was, that there was no evidence of an epidemic constitution being in operation, and hence its aid could not be invoked to account for the appearance of the disease after she had left. By reference to the chart it will be seen that Bona Vista lies in the zone between the isoclinal 30° and 53° N., and, like Sierra Leone, will experience the first part of each wave in the odd years. The points in this neighbourhood for which there are records are Sierra Leone, Bathurst on the Gambia, Goree, St. Louis on the Senegal, and Bona Vista. The first part of the wave would reach these as follows:—

Sierra Leone	about 1st January.
Bathurst	„ 1st May.
Goree	„ 1st June.
St. Louis	„ 25th June.
Bona Vista	„ 15th August.

And fever may be looked for at each after these dates, at the season when the local causes come into operation. Accordingly it is found that epidemics of yellow fever commence at Sierre Leone in the end of March or April; that of 1847 began in the end of June. The outbreak at Bathurst in 1847 commenced among the inhabitants generally in the end of July, the first death among them having occurred on the 30th of that month. Mr. Tebbs, the Colonial Surgeon, the first case in the colony, died on 30th June. The first death we know of at Goree was on the 16th August—that of a person who left Bathurst a few days before. Soon after this, however, other cases took place in persons who had not been away from Goree. In all these instances the epidemic commenced from two to three months, or more, after the arrival of the waves when the local causes of disease seem to have become active.

It has been mentioned above that a single case of yellow fever proved fatal at Sierra Leone in 1835, and that on the advent of the next wave, in 1837, the very severe epidemic took place, the appearance of which at the Gambia and Goree has just been noticed. In 1845 and 1847 a parallel series of facts occurred. In the former year three cases of yellow fever presented themselves at Sierra Leone, one on the 6th or 8th August, another on the 15th, and a third on the 16th, all of which proved fatal. The "Eclair" left Sierra Leone on 23rd July, when the subjects of the last two attacks had not arrived in

the colony.* It may be doubted by some when the cases on board that ship first assumed the character of yellow fever. I quite agree with the opinion of the compiler of the Reports on the Health of the Navy, that some of those which occurred while she was at anchor off the Seabar, to the south of Sierra Leone—that of the stoker on 23rd May, and of Field on 4th June, for instance—were not to be distinguished from those that occurred subsequently in short, were really cases of yellow fever. There is no doubt too that in 1845 cases of this disease occurred on shore at Sierra Leone, altogether independent of the "Eclair;" and, as in 1837, these were followed by a severe epidemic of the same disease in 1847.

As to the extent of operation of the epidemic cause, the details given above show this to be far more general than has hitherto been supposed. The disease arising under its influence appeared both in the "Eclair" and on shore at Sierra Leone, quite independent of each other. It sprang into existence also in Bona Vista after the visit of the "Eclair;" but though, as shown above, the wave must have reached that island towards the end of August, and she left it on 13th September, the disease did not commence among the inhabitants, who had no communication with her or her people, until 12th October, the usual unhealthy season there, and after much rain had fallen, exactly as took place in Ascension in 1838. That the wave experienced at Sierra Leone and Bona Vista in 1845 did not become extinct, there is the most unequivocal evidence; for in 1846, when it was to be looked for in the zone to the north of the isoclinal 53° N., an epidemic of fever resembling, if not actually, yellow fever was experienced at Santa Cruz in Teneriffe; and the mortality among the troops from fever in the Ionian Islands rose from 2·5 in 1845 to 6·8 per 1,000 in 1846; at Malta, from 1·1 to 3·0; and at Gibraltar, from 9·9 to 6·7. At the last-named station, one case presented yellowness of conjunctivæ and skin, and so much resembled yellow fever that an epidemic was anticipated.‡ In 1847 this wave extended to the British Islands, leading to a great development of febrile disease. Thus it appears the pandemic cause passed in successive years, according to the general course of the waves, from Sierra Leone and its neighbourhood to the south of Bona Vista in 1845, to Teneriffe and the Mediterranean stations in 1846, and to England in 1847; and under its operation yellow fever appeared in the "Eclair" and on shore at Sierra Leone, independent of each other; that either this, or a disease closely resembling it, broke out at Teneriffe in 1846, and there were indications of the same at Gibraltar. With these facts so clear it is difficult to avoid the conclusion that the epidemic at Bona Vista was owing to local causes under the operation of the more general wave, as in the "Eclair" and on shore at Sierra Leone, and was independent of the visit of the "Eclair" altogether.

In 1849 yellow fever made its appearance in Brazil, after many years absence from that country. The places at which the disease showed itself may be divided into two categories. These with the dates of the first cases among the residents were —

Bahia	lat. 13° S.	3rd Nov. 1849.
Pernambuco	„ 8° S.	25th Dec. „
Rio Janeiro	„ 23° S.	28th Dec. „
Para	„ 1° S.	— March, 1850.
Porto Allegro	„ 31° S.	— April, 1851.§

The first three lie to the north of the isoclinal 0°, and towards the end of the odd year the first part of the passing wave would be between the isoclinal 30° N. and 53° N., near the latter; and the line of demarkation between this and the following wave would still be at some distance to the south of 0°. The epidemics at these places therefore occurred under the latter part of the wave in the second year. From the information at my disposal, the epidemic seems

* These facts I ascertained at Sierra Leone subsequently. The details are given by Bryson, Account, &c., p. 102, *et seq.*

† Bryson, Account, &c., p. 101.

‡ Statistical Report on Health of Troops in Mediterranean, 1837–46, p. 83.

§ One case only.

to have declined at Bahia in the end of February, 1850, and at Pernambuco somewhat later. The line of separation between this and the following wave would reach Bahia about 1st March of the even year.

Rio Janeiro is so situated between the isoclinals 30°8 and 0°, that it would come under the first part of the wave in the odd year about 1st August, the cold and healthy period in the southern hemisphere, when yellow fever was scarcely to be looked for. After warm weather set in, however, the disease commenced on 28th December, attained its height in March, declined in May, and ceased in July. As mentioned above, one case was met with at Porto Allegro in April, which, it will be seen by the chart, is in the same zone as Rio Janeiro. Yellow fever appeared at Rio again in the early part of 1851, being the second year of the same wave there, and several times since that date.

In 1853, when the disease was again prevailing on the coast of Brazil, a fever resembling it made its appearance at Monte Video. This place, as may be seen by the chart, is situated but little to the south of the isoclinal 30°3, and consequently would be reached by the advancing wave towards the end of the even year; and, in accordance with what has been found in similar cases, the outbreaks of fever are to be looked for in the early part of the following or odd year. Though doubts were entertained whether the disease of 1853 was true yellow fever, the possibility of this occurring at Monte Video was quite established by the epidemic of 1857 there when this form of fever broke out about the middle of February, and continued to the end of May, carrying off about 1,800 persons.

The progress of yellow fever along the Pacific coast of South America, within the last quarter of a century, is quite in accordance with what has been mentioned regarding it on the Atlantic side. The disease became epidemic at Guayaquil in latitude 2° S. in 1842. This city is situated between the isoclinals 0° and 30° N., and would experience the first part of the wave about 1st June of the even year, which may be regarded as the cool season in that climate, and the time least likely for fever to appear. A schooner, "La Reina Victoria," ballasted with "wet gravelly mud," reached Guayaquil somewhere in the beginning of September, 1842, from Panama, having lost three passengers on the way, after her arrival three of the crew were landed sick with yellow fever, the last two on 7th September: all of these died, and, it is inferred, communicated the disease to those within the immediate vicinity. Carpenters and coalheavers who had direct communication with the vessel, as in so many other instances, were attacked; and it is said they propagated the disease to others, so that in less than twelve days more than forty persons had died. The schooner's position was then altered, and her ballast removed, when fever broke out anew, so that whatever may be thought of the evidence of the sick, from her communicating the disease to others, there was strong evidence that the ballast had caused it in the vessel herself, and to others exposed to the effluvia from it on its removal. Sometime then seems to have elapsed, as it was not until after the 9th October the disease began to spread, it culminated in the end of November, and by 8th December its violence was abating.* Yellow fever seems to have prevailed here, more or less, up to 1845. The coincidence of the general outbreak with the first sickly season after the arrival of the wave is here also distinct, and its delay until then, notwithstanding the supposed importation at an earlier period, must be significant.

Yellow fever appeared in Peru ten years later; the circumstances connected with its origin have been described by Dr. A. Smith,† from which the following has been taken. In 1852 a febrile complaint, new to the inhabitants, prevailed very generally in Peru, though it caused little mortality. At Lima it commenced early in January, and disappeared by July. An elderly German woman who had had an attack of this disease, after a lull of apparent convalescence, died suddenly on 16th February, with melanitic stools. In February, 1853, a fever resembling that of 1852 closely, but with a greater disposition to hæmorrhage, commenced at Lima, and continued to July as before. This year one case proved fatal on 16th April, one on 14th May, and one on 19th May,

* Transactions of Epidemiological Society, vol. i., p. 244–5.

† British and Foreign Medico-Chirurgical Review, vol. xxxiii., p. 186, *et seq.*

all of them with black vomit. Dr. Smith states these were the first declared cases of yellow fever in 1853, and they had no communication with each other. A few more isolated cases seem to have been observed up to the period of extinction of the epidemic in July. In September, 1853, the disease appeared at Yurui, latitude 90° S., among the Andes, 3° north of Lima; at the sametime it was prevalent under the first part of the same wave in Jamaica, at Puerto Caballo, and in several of the West India Islands. In the last week of December, 1853, a few cases of decided yellow fever appeared at Callao (the port of Lima), and early in January, 1854, it sprang up in Lima with extraordinary generality, and continued in force to the end of March; by the middle of April it had nearly exhausted itself. At Ica on the coast, in 18° 28′ S., yellow fever was prevalent in March, April, and May, and there were a few cases at Islay in 16° 32′ S. in April and May. Lima, as previously stated, shows the greatest prevalence of fever in the early part of the even years, which is quite in accordance with the details here given. The gradual change in the form of disease is particularly deserving of notice; a form of fever new to the medical practitioners presented itself in 1852, the first year of the wave, with a single case of melœna; the second year a few more cases presented this disposition more developed, and assuming the more common form of black vomit; and the first year of the following wave the disease generally presented the character of yellow fever. Parallel facts have already been mentioned in connection with Sierra Leone and Gibraltar, and it had been observed in Brazil that the Dengen or Dandy fever had prevailed every season for four years preceding the eruption of yellow fever there in 1849. Were the phases of disease watched as closely elsewhere as they seem to have been at Lima, such a transition would be found more common than is generally supposed.

In 1855, the second year of the wave, yellow fever was very severe at Islay on the coast, in April and May, and it prevailed in the towns in the mountains at various periods between April and October. Lima this year did not suffer from yellow fever, but intermittents were epidemic, and appeared in wards of the town scarcely ever before affected with ague. In the mountainous districts at the lesser elevations, and in some of the valleys, the disease seems to have presented much the usual character; at a greater elevation there seemed a transition to the characters assgned by Humboldt to the matlazahuatt of Mexico, and, higher still, at Huancavilica (12,969 feet above the sea), the fever was much more protracted than lower down, and resembled more the endemic typhus called *fabardillo*. In 1855 the wave which has just been traced over Peru passed into the zone between the isoclinals 30° and 55° N., and this year the matlazahuatt prevailed in Mexico, and in 1856, the second year of the wave in this zone, yellow fever was frequent in Jamaica, and invaded the military station of Newcastle at an elevation of from 3,600 to 4,100 feet above the sea. It was severe also at Havanna and Port-au-Prince, in St. Domingo. This year too, under the first part of the same wave, a few cases of yellow fever appeared at Oporto; and about the beginning of September in Lisbon, when 87 died from it. The following year the disease commenced there again in July, and began to subside in October. A few cases occurred at Ferrol and Corunna also in August, 1857.

In October, 1855, fever appeared at Cuzco, lat. 13° 30′ S. (11,376 feet above the sea), and from November to May, 1856, proved very fatal, carrying off about a third of the population. In 1856 Lima was again visited by yellow fever, which caused many deaths. This outbreak was owing to a fresh wave which, in its progress northwards, would reach Cuzco about 1st November; here, accordingly, the fever became aggravated that month, while everywhere else in the mountains it had then diminished very much or quite disappeared, and it reappeared at Lima at the usual season, then supplanting the intermittent of 1855.

These facts suffice to show that the recent epidemics of both the east and west coasts of South America, and those of Portugal, are quite in accordance with the principles developed in the course of this paper from the consideration of the progress of disease in other parts of the world. Taking the whole facts, more conclusive evidence of the existence, period, and rate of progression of the waves could scarce have been expected, while their limitation by lines

of equal magnetic dip affords the strongest presumption of their being intimately connected with terrestrial magnetism.

The character of the waves has been illustrated by epidemics at various points on land, as these have the advantage of being fixed with a population nearly stationary, and the diseases prevalent in them for considerable periods are known; but it is reasonable to conclude that their influence, which is so diffused and so regular in its action, should be manifested at sea also, whenever circumstances favourable for the development of their powers are present. To their influence may be fairly attributed many of those severe outbreaks of fever which have occurred in emigrant ships, as, for instance, the typhus which appeared in several of those from the British Islands to America in 1847, when during the whole voyage they would be little, if at all, to the south of the isoclinal 70° N., and under the full force of the wave which passed that on 1st January, 1847, and was then leading to so much fever on both sides of the Atlantic. A similar tendency to fever was observed in vessels direct from Europe, when they were sufficiently to the south to approach the coast of Brazil in 1850, and many other instances will occur to those familiar with the history of disease on board ships, which have sailed with their crews and passengers to all appearance in health, but have become very sickly before the termination of their voyage. The results may be varied somewhat as the vessel runs from east to west, or *vice versâ*, in the same wave, or proceeds from north to south, or in the opposite direction, and crosses several; in the former case the disease may be nearly continuous, in the latter there may be shorter outbreaks separated, more or less, from each other by intervals of comparative immunity. These are cases which seem explicable on this supposition only.

V. *Further particulars showing a Connection of Terrestrial Magnetism with Epidemics of Fevers.*

The evidence to be adduced here is less complete than that given above; but, nevertheless, there are a number of facts showing a remarkable coincidence, at least, between magnetic phenomena and epidemics, which deserve special mention, and which may ultimately prove to be intimately concerned in their production.

The first point deserving of notice is that the magnetic intensity in the southern hemisphere is greater than in the northern; a fact which may be connected with the origin of the waves in the southern hemisphere and their regular passage to the northern.

Magnetic storms, as they are called, seem in some way connected with the intensity of epidemics. These storms consist of great and rapid alterations of the force of the magnetic elements, causing the instruments to oscillate to a much greater extent, and in a more irregular manner than is usual for the hour of the day, or season of the year. It has been observed by Sabine that these storms recur in a regular period of about ten years, the minimum occurring in the years three and four in each decade, and the maximum in the years eight, nine, and ten, while the transitions from the minima to maxima, and *vice versâ*, are rather abrupt. Sabine has further drawn attention to the fact of these magnetic storms coinciding in period and epoch with the frequency of the solar spots. Those who have examined the records of epidemics may recollect that the years seven, eight, and nine, in each decade in the present century, have been characterised by an unusual prevalence, and severity of fever in many parts of the world. Severe fevers are occasionally met with in the years three, four, and five of the decade, but they do not seem so diffused as in those numbered seven, eight, and nine. The facts of these periodical aggravations of fever being accompanied by a disturbed state of the earth's magnetism, and of their being apparently connected with unusual disturbance of the sun's photosphere, open up a field of enquiry of the deepest interest, which bids fair to throw into the shade the wildest fancies of the astrologers.

These details show a connexion between magnetic excitement and the periodic aggravations of febrile diseases thorughout a large portion of the world, more especially in the years seven, eight, and nine of the decade; but they do not indicate the steps in the conversion (to use an expression more in

common use) of the magnetic force into the active cause of disease, and until much more is known of the laws of terrestrial magnetism, and of the immediate causes of magnetic disturbances, we will not be in a position to do more than point out their connection in a general manner, though, even here, some facts have been ascertained which promise a rich harvest if followed up.

It has been deduced from an examination of the regularity of the indentations in the curves, traced by the magnetic registering apparatus at Kew, that, during the magnetic storms, the disturbing forces of the magnetic elements are such as to affect all these, or one of them, either alone, or more than the others. The former are by far the most frequent, and have been attributed to a cosmical influence, while the latter are most probably dependant on a terrestrial one.* In connection with this, though derived from observations altogether independent, may be noticed the effects of magnetic storms on electric telegraph lines. During these storms earth-currents, as they are called, are often so strongly developed that the ordinary battery employed for working the lines is insufficient to give precise indications, even at a moderate distance. Mr. Walker, the superintendent of the electric telegraphs of the South Eastern Railway, states that 1847-48 were periods of great activity of these currents, while 1849 was one of almost inaction, and this state of quiescence continued apparently until 1856, when they again excited attention, and a large number of observations accumulated in 1857 to 1859;† but I have not met with an abstract or reduction of them. The coincidence of these currents in 1847-8 with the epidemics of those years cannot be fortuitous; and these cessations in 1849, though by the observations of declination at Toronto in that year, it is apparent magnetic disturbances still continued active,‡ not only goes to support the opinion noticed above that both cosmical and terrestrial influences are concerned in producing these, but that each may to some extent act independently of the other. It also throws some light on the fact that, though the magnetic storms continue into the tenth year, and even beyond it, yet the seventh, eighth, and ninth years are those in which the general aggravation of fever occurs.

Dr. Augus Smith, of Manchester, has stated that ground giving out malaria is alkaline.§ If this be always so, from the well-known influence of electric currents in determining the positions of acids and alkalies, after decomposing the neutral compounds which these previously formed, some clue may be found to unravel this hitherto complicated and obscure subject. These hints may suggest the direction in which enquiries must be made, but the points they refer to, and the deductions these will support, can only be established by a full and searching investigation.

If the reader will revert to Table I he will find that in 1823, while there was a severe epidemic of yellow fever at Sierra Leone, the West India Islands and Jamaica presented less mortality from that class of disease than for several years, either before or after. In 1829 there was a similar outbreak at Sierra Leone, with a minimum of mortality both in the West Indies and Jamaica. In 1859 a parallel series of facts presented themselves, there having been a severe epidemic of yellow fever at Sierra Leone, Bathurst on the Gambia, and Goree, while in Jamaica there was very little fever; but 1824, 1830, and 1860, were all more sickly in Jamaica than the years immediately preceding. Meteorological conditions may have had something to do with the immunity of the West Indies and Jamaica in 1823 and 1829; but as to 1859, though in Jamaica at the time, and constantly engaged with meteorological observations, I was unable to detect anything very unusual, and I am not aware of any peculiarity, either in the habits or condition of the people, to account for the immunity they enjoyed. Another feature which presents itself in the course of epidemics is not only that yellow fever may be prevalent in the customary localities, or even in others where it is rarely met with, but about the same time, in countries remote from these, fevers of a different form may be very frequent, and accompanied by yellowness so generally as to characterise the epidemic.

* Stewart, Proceedings of Royal Society, vol. xi., p. 1 7.
† Proceedings of Royal Society, vol. xi., p. 105-8.
‡ Sabine, Magnetic Observations, Toronto, Introduction, p. xxii.
§ Year Book of Medicine and Surgery (Sydenham Society) for 1861, p. 463.

Examples of this are found in Iceland and the coast of Holland in 1826, with a few cases of yellow fever at Gibralter that year, and in Iceland in 1838, with a corresponding disease to the south-west of Lake Erie. Though these facts are clear and unmistakeable it is not easy to explain them; it is possible that the remarks by Stewart given above, as to the combination of cosmical and terrestrial influences in producing magnetic disturbances, may ultimately throw much light on them, but until the nature of the terrestrial influences in question be more fully known, and the limits of their operation determined, so that the results may be compared with the epidemics over a sufficiently extensive portion of the world, it would be useless endeavouring to push this speculation further. It is deserving, however, of the most searching enquiry.

Since writing the above it occurred to me to examine how far the principles developed in this paper were borne out by the records handed down to us of the epidemics of former ages. A cursory examination of these since the fourteenth century, inclusive, will show that in Spain, Italy, south of France and of Germany, the epidemics of fever, or plague, were more frequent in the even years, while in England, north of France, and of Germany, they were more common and more severe in the odd years, exactly as in the present day.

The earliest observations on the magnetic dip were made in 1576 by Norman, who found it 71° 50′ in London. The next observations then were by Graham in 1720, when he found it 74° 42′. Between these dates the dip had been found in Paris, in 1671, to 75° 0′, and as it was generally about 1° greater at London than at Paris, it is likely that at London, about 1670, it would have been 76° nearly. The dip thus increased at London for nearly a century from Norman's first determination, since which it seems from the observations there and at Paris to have diminished pretty regularly.

On the assumption that the advancing edge of the pandemic wave makes the isoclinal 70° N. on the 1st January in the odd year, and passes over the space between that and the isoclinal 80° N. in a year, the wave would reach 76° by 8th August, which would still permit a severe epidemic being developed in England in the same year. When the dip approached more to that laid down in the chart attached to this paper, the cause of the waves would agree more closely with what is stated above; but inasmuch as the form of the isoclinals much to the east or west of England, at the earlier periods, must be matter of conjecture, it will not do to assume the inflexions of these in the chart will apply to those periods.

The position here taken is borne out by the monthly records of the mortality from plague in London, in 1665, which are as follows:—

June	590
July	4,129
August	20,046
September	26,230
October	14,373
November	5,449
December	1,009

Though the materials for plague were evidently abundant, and numerous deaths took place from it in July, yet the advent of the wave in August is distinctly marked by the rapid expansion of the mortality in that month.

REPORT ON CERTAIN CONVEYANCES FOR USE IN TRANSPORTING SICK AND WOUNDED FROM THE FIELD OF ACTION,

MANUFACTURED BY MESSRS. FISCHER & Co., OF HEIDELBERG.

By Deputy Inspector-General T. LONGMORE, Professor of Military Surgery at the Army Medical School, Royal Victoria Hospital, Netley.

In the early part of the year 1865, Messrs. Fischer & Co. called the attention of the Secretary of State for War to a variety of ambulance transport conveyances and surgical appliances constructed by them for the use of sick and wounded soldiers in the field. A descriptive catalogue, with photographic drawings of the several articles, were forwarded at the same time.

The following conveyances, selected from the list above referred to, were obtained direct from Messrs. Fischer & Co., for examination and purposes of illustration at the Army Medical School, viz.:—

A. Pirogoff's two high-wheeled hand-litter (Tragbahre auf zwei hohen Rädern, nach Dr. N. Pirogoff.)

B. Gablenz's hand litter on two lower wheels, adapted for removal from the wheels and for carriage by hand (Zusammenlegbare Tragbahre auf zwei hohen Rädern, nach Gablenz).

C. Apparatus for carrying a wounded man on the back of a bearer *en cheval* (Schulterbahre mit Rückensitz).

D. Chair litter or cacolet, carried by two bearers, either marching abreast or in file (Stuhlbahre mit beweglicher Rückenlehne und Fussstütze).*

The following are the descriptions given by Messrs. Fischer & Co., the manufacturers, in their catalogue, of the special qualifications and purposes of each of the above named contrivances:—

A. (No. 22 in the Catalogue). Litter on two high wheels, after the design of Dr. N. Pirogoff. On this litter a single bearer can easily transport two patients, even along very narrow paths. The litter can be taken in pieces for package. It may be furnished with a vessel for carrying drinking water.

B. (No. 21 in the Catalogue). Hand-litter, so arranged as to permit of its use mounted upon two wheels, or, as a stretcher, off the wheels. When on wheels, one bearer can easily push or draw a patient over the worst roads. It may also be employed as a sledge. It is so arranged as to enable the patient to lie on it in various positions. Owing to its light weight it can be lifted, even when mounted on wheels and with a patient upon it, by two men easily, over ditches or other obstacles.

C. (No. 12 in the Catalogue.) Shoulder litter, for carrying a patient in a sitting posture on the back of a bearer. By this means a bearer can easily carry a man on his back for a long distance without being over-fatigued, and without the necessity of the patient holding himself on.

D. (No. 4 in the Catalogue.) Chair litter, with jointed back and feet supports. This appliance is suitable for carrying a wounded man a very great distance. According to the nature of the ground, the two bearers may both face the road on which they are marching, or they may walk one behind the other.

All these four conveyances have been practically and carefully examined, and will now be remarked upon according to the order in which they have been placed in the descriptive list above given.

The drawings which illustrate this report were made from the several articles described in it by Staff-Assistant Surgeon H. C. Gillespie.

A. *Pirogoff's Two High-wheeled Hand-litter.*

(No. 22 in Messrs. Fischer's Catalogue.)

This hand-litter, which closely resembles in general appearance Neudörfer's two-wheeled litter figured and described in the Army Medical Reports, vol. v,

* These conveyances now form part of the collection in the Museum of Military Surgery at Netley.

page 509, figs. 4 and 5, is constructed for the transport of two wounded soldiers. All the woodwork is made of ash.

When dismounted, this litter consists of the twelve following detached pieces or parts :—

a. Two wheels and two screw-caps ;
b. Two jointed shafts ;
c. One axle-tree ;
d. Two folding-stretchers ;
e. One hood ;
f. One iron screw-bolt and turnscrew combined ;
g. One canvas bearing seat.

The several parts when packed for convenience of stowage, are placed together in the same manner as the parts of Neudörfer's litter shown in vol. v of the Army Medical Reports just alluded to. When so arranged, they occupy a circular space nearly four feet in diameter, corresponding with that of the wheels, and about one foot in depth.

The following is a description of the parts above-mentioned :—

(*a.*) The wheels. Each wheel, as stated before, is nearly 4 feet in diameter. The rim, which is bound with iron, is narrow, being only one inch and a-half in width. The spokes are slender. The nave is nearly six inches in length, and is fastened to the axle by an iron cap which is made to screw on the end of the axle. It is secured in position by an iron pin, which passes through both cap and axle ; this pin is attached by a strap to an adjoining part of the nave. Both the pin and screw cap are easily removed and refixed at pleasure. The wheels are made to fit each side of the litter alike.

(*b.*) The shafts. These are each 7 feet 3 inches in length, 4½ inches in depth, and 1¼ inch in breadth. At about 2 feet from each end they taper off to form the handles. Each shaft is jointed, being united half-way of its length by two strong hinges ; at the same time, for further security, one-half of the shaft is inserted into the other at the place of junction by means of a tongue and corresponding groove. The shafts are supported on the axle-tree of the litter by two-iron bows, not by springs. The bows are each secured to the axle-tree by an ingenious kind of double key or bolt, which admits of the shafts being taken away from the axle-tree with great facility, and which can be applied for locking them securely to it with equal ease and celerity. These keys are attached to the axle-tree by straps. The two shafts are further held together by two iron cross pieces, or traverses, one near the centre, the other at one end of the united shafts. One traverse is connected by a hinge with one shaft, the other traverse with the other shaft, so that each can be folded back, or extended, and hooked into the opposite shaft, at will. The traverse near the end is inclosed in a cylinder of wood, so as to answer the purpose of a convenient handle for pushing the carriage.

(*c.*) The axle-tree is made of iron, and about 1¼ inches in diameter. It tapers off towards the ends, which pass through the naves of the two wheels.

(*d.*) Two folding stretchers. Each of these stretchers consists of three sections, joined by hinges. Each section is formed by a wooden frame filled up with interlaced canvas bands. The last section of each stretcher has, in addition, a canvas belt, with straps and buckles fastened to its upper surface, which is intended to receive the legs and feet of the patient. The hinges are so placed that the three sections can be folded back one upon the other. When thus folded together, the whole of each stretcher is comprised in a package of 18 inches square by 4½ in depth. When fully extended, the stretcher is about 5 feet long ; its greatest width is 18 inches, but it narrows by two or three inches towards its lower end.

Attached to both the upper and the middle sections of the stretcher, on each side, is a strap and buckle embracing a strong iron hook of a peculiarly bent shape. These hooks are intended to be inserted into iron eye-bolts fixed on the inner aspects of the shafts. By these means, the two stretchers are suspended within the carriage, the one before, the other behind the axletree, in such a manner, that when two patients are carried, they recline in their respective litters back to back with the axle between them. The middle section of each stretcher hanging about a foot below the level of the shafts, and the whole of each stretcher being comprised within the two shafts, the

patient is protected from falling off, as regards the middle and upper portions of his body, by the shafts on either side, and is further secured in position by having his legs strapped to the lowermost section of the stretcher.

(*e.*) The hood can be expanded or closed, as desired. It is made of light canvas stretched upon four slender iron rod frames, the two central frames being smaller than the outer, and thus capable of being folded up within them. The ends of all the iron rods, on each side, are hinged upon a Y-shaped iron tongue, which is made to fit into an iron sheath on the outer side near the centre of each shaft. By this means the hood is held securely in its proper place, but can, when necessary, easily be removed altogether. When in its place, it may also be employed to protect only one, or both patients, or it may be kept closed.

(*f.*) The iron screw-bolt and wrench, the stem of which is a little over a foot in length, and nearly an inch in thickness, is used for bolting together the two wheels when the carriage is arranged for stowage. At one end of this bolt is a solid iron boss or knob; at the other, a cross bar capable of being screwed on or off at will. At one part of this cross bar a piece is cut out, corresponding in shape and size with the screw-caps of the wheels, and the bar serves thus as a turn-screw or key when required. When not in use, the bolt, together with the cross piece, is placed beneath the lowermost section of either one of the stretchers, where it is held by means of suitable straps attached for the purpose.

(*g.*) The bearing seat consists of a piece of stout canvas doubled, 21 inches long by 14 in breadth. It is stretched out cross-wise at each end by a round piece of wood secured within its folds. Each of these pieces of wood is left exposed at the middle, so that it may be grasped by the hand of a bearer. Thus a seat is formed on which a patient may be placed and conveyed by two bearers, each using one hand to carry the seat, while the other is left free to support the patient's back, or otherwise to assist him during the transport.

The following is the readiest mode of putting together the several parts just described, in order to make the litter ready for use. Two persons are required for the purpose.

Set the wheels up, insert the axle, and secure them together by the two screw-caps and iron pins. Hold the two shafts opened at full length over the axle, place the iron bows by means of the openings on their under surface upon the two pairs of pins on the upper surface of the axletree, and fix them in position by the double keys mentioned before. Lastly, suspend the two folding stretchers and set up the hood.

The following is the manner in which the patients are brought and placed upon the conveyance after it has been made ready for their reception:—

Two attendants are requisite to bring the patients in, and to place them, in succession, on the suspended stretchers. When the canvas bearing seat, before described, is used, the patient must be carried in a sitting posture. On reaching the conveyance, it is to be tilted down towards that end at which the patient is to be placed. The folding stretcher is thus brought closer to the ground, and the patient can be more easily transferred to it from the canvas bearing-seat. If necessary, as, for instance, in cases of injuries to the legs or feet, the patient will be secured on the stretcher by fastening his legs to its lower section by means of the straps and buckles provided for this purpose. When a second patient arrives, the opposite end of the vehicle is tilted down to the ground, and so held until the patient is lifted upon the corresponding stretcher, as in the previous instance.

The use of this carriage was tested at Netley on paved ground, on newly gravelled ground, and on very rough and uneven ground. The following points were more particularly inquired into:—

1. Convenience with regard to lifting patients from the ground, and carrying them on the canvas bearing-seat preparatory to their being placed upon the litter.

2. Convenience with regard to placing patients upon the folding stretchers.

3. Convenience as regards movement of the carriage, either by draft or pushing, by one man, with two patients reclining upon the litter.

4. Convenience as regards movement by one man when only one patient is carried.

5. Convenience as regards movement of the carriage by two men when two patients are carried.

6. Effects, as regards concussion of the patients, from the substitution of the system of slinging the folding-litters, instead of placing them on springs.

7. Amount of protection afforded by the hood.

The following were the results of the inquiries above mentioned:—

1. The bearing-seat, simple as it is, was found to answer its purpose exceedingly well. There was no difficulty in slipping it under a man lying or sitting on the ground, and when once slipped beneath him, the man was easily raised into a sitting position, and so carried by two bearers.

If the patient were weak, or wounded in the arms or upper part of the body, each bearer, in addition to holding the bearing seat by one hand, would have to support the back of the patient by his other arm. To accomplish this, it was found necessary that the arms by which the bearers carried the seat should cross their front respectively, leaving their arms nearest the patient disengaged and ready to act as supports behind him.

If the patient, however, were sufficiently strong not to require support to his back, or were wounded in either of his lower extremities, then the bearers would grasp the seat with their hands nearest to it, while the patient, to keep himself securely in position, could fold his arms round the backs of the bearers on either side.

In either of these ways a couple of bearers could carry a man of average weight from one given spot to another for a distance of a few hundred yards very conveniently, and without much fatigue.

Altogether, the employment of this simple contrivance furnishes a method of conveying patients for comparatively short distances, *infinitely preferable*, for ease and convenience, to carrying them on crossed arms or in any of the other positions generally chosen when special conveyances are not forthcoming; and it might be worth considering whether some of these bearing-seats could not be used with advantage in the field, as supplementary to the regulation stretchers, and principally for bringing off the field such men as do not require to be carried in a recumbent position. The small space these bearing-seats occupy, their lightness and handiness, would enable them to be taken into the field by bearers with very little inconvenience.

2. Although the practicability of placing the patients from the bearing-seats upon the folding stretchers was established, at the same time it was apparent that care and practice were required to accomplish this with ease and celerity.

Owing to the suspension of the stretchers within and below the level of the shafts, it was found advisable, with regard to the foremost stretcher, to open the cross-piece in front of it, in order that the patient might be carried between the shafts and lowered down upon the folding stretcher. This plan obviated the necessity of lifting him over the shafts for the purpose of placing him on the stretcher; a proceeding which, on trial, was found extremely troublesome and inconvenient.

With reference to the rear stretcher, no cross-piece being attached to it, and the shafts being shorter than the stretcher itself, no inconvenience was experienced in placing the patient on it.

As there are no upright supports or other means of sustaining the shafts in a horizontal position, the necessity arises for their being securely held by a third attendant, while the two bearers are engaged in placing a patient on one of the litters. Likewise, if the same two bearers, who brought the first patient, have to return to fetch the second patient, the carriage must equally be held in the interval in a horizontal position by a third attendant.

The bearing-seat, on which the patient has been carried, remains under him after he has been placed on the folding stretcher; it is therefore available for lifting him again off the carriage; and the two bearing-seats will, accordingly, never be completely separated from the carriage to which they belong.

3. Two patients having been placed into the litter, to be conveyed, either by draught or pushing, by one man, it was found that—

a. There was no difficulty in wheeling the carriage along on a pavement;

b. On a newly gravelled road, although on a level, it was very difficult to move the carriage, either by drawing or pushing, and an amount of exertion was necessary sufficient to quickly fatigue a strong man;

c. On rough and broken ground, but sufficiently hard to prevent the wheels from cutting into it, it was found scarcely possible to wheel the carriage even for a very short distance.

4. When only one patient was occupying the litter, and one man was employed to wheel it, considerable exertion was found to be requisite to move the conveyance.

There was not much appreciable difference in the amount of exertion demanded and difficulty experienced whichever of the two folding stretchers, the front or rear one, was selected to place the patient upon.

When the patient was put into the front stretcher, his weight came to lie between the fulcrum, or axle, and the sustaining power, or bearer, and was, moreover, not balanced by any counter-weight on the rear stretcher. The bearer had, therefore, to exert himself to sustain the carriage in order to keep the patient in proper position, in addition to the expense of power necessary to wheel the carriage.

On placing the patient upon the rear-stretcher, although the weight was more favourably situated with regard to the bearer in front, yet still a good deal of exertion was found necessary to maintain the equilibrium, and to press down the handle so as to keep the shafts in a horizontal position, independent of the exertion requisite to move the vehicle. Irregularities of the ground, moreover, were found to cause sudden violent jerking of the handle upwards, and, under these circumstances, the bearer had to take special care to prevent the remote end, where the patient lay, from touching the ground.

On the whole, there appeared to be nearly as much difficulty for one bearer to wheel the carriage with only one patient in it, as with two, the advantage afforded by the establishment of an equilibrium in the latter case being so considerable.

5. When two bearers were employed to wheel the carriage with two patients upon it, no practicable difficulty was found on any of the kinds of ground before mentioned.

6. The position of the patient in each stretcher was found to be sufficiently easy and secure, and the amount of concussion over any kind of ground moderate. Caution was necessary to slacken the pace and movement when the vehicle was pushed or drawn over very rough ground, both to avoid sudden jerks in the hanging litters, and to prevent the arms or sides of the patients from coming into collision with the shafts. Their legs and feet were sufficiently protected against injury by being fastened within the belts provided for this purpose.

7. The hood was found to be inconvenient when not expanded, from not being provided with means of maintaining itself in an upright position. It was liable to fall down on either side so as to annoy the patients. It was also evident that the hood would have chiefly to be carried folded up, as the patients, under ordinary circumstances, would rather suffer slight inconvenience from weather than undergo the exclusion of view and lessened freedom of breathing caused by having their faces completely enveloped by it. The hood would only be of use in heavy rain or under a very scorching sun, while it offers no protection against the dust which may rise from the ground over which the conveyance is wheeled.

The results of the experiments under these several heads having thus been noticed, the following remarks suggest themselves:—

a. On a comparison of the alleged advantage of Pirogoff's wheel-litter with the other wheeled conveyances accessible at Netley for examination and practical test; and,

b. On the advisability, or otherwise, of its introduction among the material of the British transport service.

The wheeled vehicles included among the collection in the Museum of the Army Medical School and available for practical experiments, were—

1. Colonel Clerk's combined Commissariat and Ambulance barrow;

2. Neuss's litter (both of which conveyances have been already noticed in the Army Medical Reports, vol. v); and,

3. *Gablenz's low-wheel litter, to be noticed presently.*

a. The chief advantages of *Pirogoff's litter*, as compared with other wheeled conveyances, are stated to be:—

(1.) Saving of labour by its permitting the carriage of two patients by one man, while other litters are only capable of carrying one patient each under any circumstances;

(2.) Its capability of being folded up and packed for stowage, occupying, as a package, only a small space.

With respect to these differences and alleged advantages compared with other wheeled vehicles, the experiments made here have shown:—

1st. That the labour of wheeling two patients by one man over ordinary ground is so great as to render its continued exercise impracticable. Pirogoff's conveyance does not, therefore, possess the superiority mentioned under the heading (1.)

2nd. Pirogoff's conveyance professes to admit of being packed up into a circular space of four feet in diameter by one foot in depth; but on examination it was found that no means were provided of connecting the several parts of the conveyance in such a manner as to keep them together within the space mentioned. The two wheels are held together by the iron screw-bolt, and the other parts have then to be placed separately and loosely in the interval left between the two wheels. It becomes necessary, therefore, to place the whole into a packing case, and to take steps to prevent the several parts from injuring each other by collision among themselves during the movements attendant upon transportation. The packing case in which the conveyance was forwarded from Heidelberg, consisted of a square deal box, the dimensions of which were 4½ feet square, by over 1 foot in depth, and the weight about 130 lbs.

This very considerably lessens the advantage alleged to exist under the heading (2.) All the other wheel-litters available for comparison admitted of a readier and firmer mode of packing, with the exception of *Neuss's litter*, which only allows of the removal of the wheels for stowage, and cannot be much reduced in bulk.

b. In considering the advisability of the introduction of Pirogoff's hand-wheel litter among the transport material of an army, the following points occur to notice:—

1st. The want, or the possession in only a very modified degree, of the advantages enumerated under the heads *a* (1) and *a* (2), deprives this conveyance of its special features of supposed superiority over other wheeled conveyances moved by hand labour.

2nd. Although capable of being readily wheeled by two men with two patients upon it, it is, when thus employed, less useful than any of the three wheel-litters which have been submitted for comparison, and each of which admits of the easy transport of one patient by one bearer. Two patients can be wheeled on two separate litters by two men, and there is, therefore, no saving of labour in either case. Any conveyance in which the patients can be carried in a fully recumbent position, is preferable to one only fitted for the reception of certain special injuries. All cases of injury, however severe, and in whatever part of the body the wound may be situated, can be carried in any one of the wheeled-litters available for comparison; while Pirogoff's conveyance is only adapted for such patients whose wounds allow of their being carried in a sitting or semi-recumbent position.

3rd. So long as the several parts composing Pirogoff's litter are separable as at present, and without any definite place for their reception when the conveyance is taken in pieces for package, so long will there be a liability to one or more parts being mislaid by oversight or neglect, and the absence of almost any one part will render the whole conveyance useless.

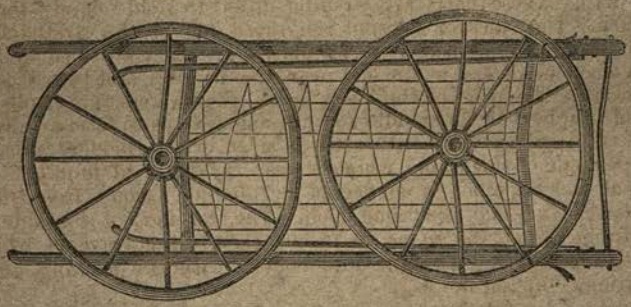
4th. The want of protection of the patient from dust arising from the road, and the instability of the hood, when not required to keep off rain or strong sun, are objectionable circumstances.

For these reasons, the conclusion is inevitable, that Pirogoff's two-wheel litter is not so suited as other conveyances of the same class for the purposes of military medical transport.

B. No. 1.

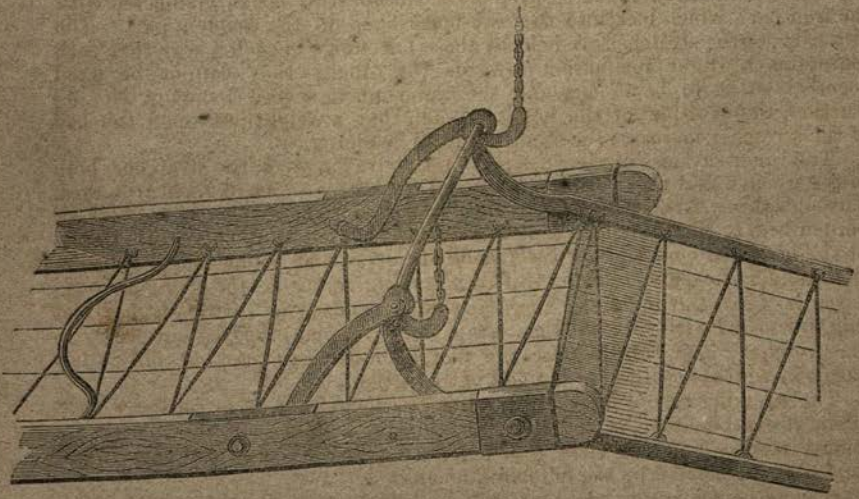
Gablenz's Litter on Two Low Wheels.

B. No. 2.



Gablenz's Litter, separated and arranged for packing.

B. No. 3.



Shows the method by which the two arms of the Folding Stretcher are fastened together, and also the manner of fitting the Stretcher itself to the axle-tree.

B. *Gablenz's Litter on two Low Wheels.*

(No. 21 in Mr. Fischer's Catalogue.)

This litter (see Drawing B, No. 1) consists of two principal parts, viz. :—

(*a.*) A folding stretcher.

(*b.*) Two low wheels connected by an axle.

These are separable into four detached portions, viz., the folding stretcher, the axle, and the two wheels. The weight of the stretcher is 48 lbs., that of the wheels and axle is 39 lbs.

When these portions are arranged for transportation, they are packed in the following way

The stretcher folded up, one-half lying within the other half. The two wheels are laid one behind the other upon the folded stretcher, and the axle is laid by the side of the whole. A package is thus formed 5 feet in length, 2½ feet in width, and about 10 inches in depth. (See Drawing B, No. 2.)

There is, as in the case of Pirogoff's litter, no arrangement for securing the several parts together, and they, therefore, also require, both for preventing their separation from one another as well as for protection from injury, to be put into a packing-case when they have to be carried on ship board or on transport wagons.

The following is a description of the principal parts of this litter :—

1. The stretcher is jointed near its middle, and thus consists of an upper and a lower half. These parts are so hinged as to fold closely together when necessary. The sides, or poles, of the upper half of the stretcher, that on which the head of the patient would be placed, are made of wood and connected by a wooden traverse at the end near the handles, and by a bent iron traverse beneath. The poles of the lower half of the stretcher are made of one solid piece of iron bent in the middle at right angles so as to form a third side, or traverse, and together to constitute three sides of an oblong frame. The fourth, or open side of this frame, which is near the place of junction of the two halves of the stretcher, is connected by an independent iron traverse, placed at a lower level than the frame itself. The two ends of the side poles of the iron frame are curved so as to be attached to this traverse, which is thus prevented from being brought into contact with the sacking, or from hurting a patient lying on it.

The breadth of the wooden frame portion of the stretcher, inside the poles is 26 inches; that of the iron frame portion is 22 inches. This difference enables the stretcher to be closely folded together, one part within the other. The length of the open stretcher, including the handles, is 7 feet 10 inches. It is secured in its extended position by means of two hooks connected with the iron part, which lock into two eye-bolts fixed in the wooden part. The two parts of the stretcher are held by these fastenings in such a way that each maintains a slight inclination towards the other; they cannot be fixed together so as to be in one and the same plane. (See Drawing No. 3.) Further, the position of the hooks is such that a weight put upon the bed of the stretcher increases the security of the fastening.

The inner surfaces of the sides and of the traverses of the stretcher, both of the wooden and iron portions, are furnished with a series of fixed iron eyes. Through these eyes successively a rope is passed, so as to form a network, or corded bed, to the stretcher. Upon this corded bottom again there rest: firstly, at the head, an empty pillow-case, made of canvas, and connected by rings, so as to render it capable of being shifted according to the height of the patient; secondly, near the middle, a slightly padded bandage or girth, about 2 feet long, furnished with three leather straps for strapping the patient safely to the stretcher; and, thirdly, near the foot, a similar bandage, but only a few inches in width, for securing the feet of the patient.

The stretcher can be used for carrying a patient either off or on the wheels. Again, it can be either placed upon the wheels, or taken off them, with the utmost readiness. This facility of converting the wheeled carriage into a hand-litter is effected by the following means:

A small bent piece of iron is attached by strong rivets to the curved end of

each of the two iron poles and the connected traverse before described, and these pieces, together with the ends of the poles themselves, form openings capable of receiving within them the axle connecting the two wheels. These openings are rectangular, to correspond with the square shape of the axle, and are spoken of as the "knees of the stretcher hinges." A short iron chain, with a spring hook at the end, is suspended from each of the curved pieces of iron which help to form the knees just mentioned. (See Drawing B, No. 3.) When the stretcher is placed upon the wheels, all that has to be attended to is that the rectangular openings fall properly upon and embrace the square parts of the axle. They are then fixed in position by winding round both the axle and the adjoining traverse of the stretcher the iron chain, which is then secured by being hooked to one of the ropes of the corded bottom of the stretcher.

For removing the stretcher, the chain has only to be unhooked from the netting, and to be unwound from the axle and traverse. The stretcher can then be lifted off the axle and wheels.

The *wheels* correspond in general features with the wheels of Pirogoff's litter already described, and differ only in size. The diameter of each wheel is 2½ feet.

The following is a further statement by Messrs. Fischer and Co., the manufacturers, of the merits of this form of hand-wheel litter:—

"Besides its easy stowage and portability, Gablenz's litter has the great advantage of offering the patient a secure position, even if rapidly moved down hills, owing to the angle formed by the two parts of the stretcher on which the chief weight of the patient is placed.

"The stretcher is light, and, when required, is quickly and easily separated from the wheels and axle, and can be used separately.

"If a patient is to be conveyed on this litter, either the stretcher may be taken off the wheels and put on the ground to place the patient on it, and without removing the patient, re-fixed on the axle; or the lower and heavier end may be brought down close to the patient's back, and the patient drawn upon it in a sitting posture.

"By the application of a very simple contrivance this carriage may be converted into a sledge."

This litter was experimented upon over ground of various descriptions, both on and off the wheels, and the following results were observed:—

1. When a man was lying on the ground his removal to the stretcher, whether on or off the wheels, was very easily effected. The angle at which the two parts of the stretcher are joined facilitates the transfer of the patient, as the narrower and heavier end of the stretcher can be made to glide under the patient's back, and it is, therefore, not necessary to lift him so completely up from the ground for the purpose of carrying and placing him upon the stretcher, as is required when ordinary stretchers are employed.

2. In carrying a man upon the stretcher off the wheels, he is not so much shaken as upon an ordinary stretcher. This is owing to the fact that the side poles are more rigid on account of their being composed of two pieces firmly joined in an angle midways, while in ordinary stretchers each pole, consisting only of one long piece, more or less elastic, sways up and down with the steps of the bearers.

3. The position of the patient upon the stretcher is easy, and the girths maintain him secure in that position.

4. The weight of the stretcher, when used off the wheels, causes fatigue to the bearers after a short time. With a heavy man upon the stretcher two bearers of ordinary strength would require to halt after about every two hundred yards of marching. But the stretcher can be placed temporarily on the ground so as to give the bearers rest, its weight being supported on the central iron traverse, without inconvenience to the patient.

5. By a certain amount of management the stretcher, with the patient upon it, can be easily and rapidly placed upon the axle connecting the wheels, and secured there. But it would be necessary to lay down rules defining the manner in which this manœuvre is to be done, and some little practice is required to do it with celerity when a patient is on the stretcher.

C. No. 1.

Apparatus for carrying a Wounded Man on the back *en cheval*

C. No. 2.

Supporting Belt.

C. No. 3.

Mode of using the apparatus.

6. One bearer was found to be able easily and rapidly to wheel the litter, with a patient lying upon it, over level roads covered with loose gravel, either by pushing or pulling the conveyance.

7. No more than a moderate and easily supportable amount of exertion was required to wheel the litter up a rather steeply-inclined and very rough road.

8. The men who were carried in the litter found their position easy, and stated they did not experience inconvenience from jolting even when the stretcher was wheeled rapidly over very rugged ground. This appeared to be chiefly due to the elastic nature of the bottom of the stretcher, and to its padded girths.

As shown by the experiments referred to above, this form of hand-wheel conveyance appears to have several qualities to recommend it to favourable consideration. The moderate amount of labour, and the rapidity with which it can be wheeled even over rough ground, the comparative facility with which the stretcher can be transferred on and off the wheels, the easy and secure position of the patient upon it, the capability of the litter being taken to pieces and folded for package, the moderate amount of space in which the separate parts can be stowed away, and the not excessive weight of the whole conveyance, viz., 87 lbs., are all qualities in its favour. Such wheeled stretchers would undoubtedly save labour and prevent delay in relieving the wounded whenever the ambulances, or flying hospitals, were unavoidably posted at a distance from a field of action, and, like Neuss's litter previously remarked upon,* might also be adapted for use in the conveyance of sick and hurt on home stations and in garrison towns. In these latter instances, however, the merits possessed by Gablenz's conveyance of capability of separation into several parts, and its facility of package, would be of less material importance; while the protection from rain and dust afforded by the head and cover, and the greater height at which the patient is raised from the road, in Neuss's litter, would probably more than counterbalance its want of the advantages mentioned as characteristic of Gablenz's conveyance. To give Gablenz's litter a higher title to recommendation, the objectionable weight of the stretcher, which is strongly felt when it is used apart from the wheels, would have to be reduced; and, for package and stowage, the wheels should admit of being placed within the same limits as those of the sides of the folded stretcher, while the whole should be arranged for being secured together without the necessity of the employment of a packing case.

Should, however, it be thought worth while to devote attention to the improvement of this litter, it would be well at the same time to ascertain if the ordinary regulation stretcher of the British service could not be rendered available and adapted to wheels, as was done in Colonel Clerk's combined commissariat and ambulance barrow dispatched to China in 1860. A conveyance for ambulance purposes would then be constructed in which the uses of the regulation stretcher would be preserved, while the advantages of gain of power and speed of movement, by means of the wheels, would be added to it.

C. *Apparatus for carrying a Wounded Man on the Back of a Bearer, en cheval.*

(No. 12 in Messrs. Fischer's Catalogue.)

This apparatus consists of two parts, viz., a seat for the patient, and a detached supporting belt. (See Drawings C, Nos. 1 and 2.)

The following is a description of these two parts:—

1. The patient's seat is made of a piece of beech wood, smooth on the surfaces, hollowed out and padded on its inner edge, to adapt it to the loin of the bearer, and generally rounded on its outer edge. Its greatest dimension across from side to side is 22 inches, its breadth 6 inches, its thickness three-quarters of an inch. Two shoulder-belts made of canvas girthing, 3 inches in width, are nailed to the lower surface of the seat. Each of these two belts is 22 inches long, and terminates at its full extremity in a leather

* Army Medical Reports, vol. v, p. 510.

strap, 1 foot in length, with punched holes for the reception of the tongue of a buckle. These belts are padded and covered with soft leather at the parts where they rest on the shoulders of the bearers. A narrower and shorter strap, ending in a buckle, is nailed to the seat on the outer side of each of the long shoulder-belts just described. Each of these two shorter straps is 11 inches long.

The weight of the seat, with the belts and straps attached to it, is 3 lbs. 4 oz.

2. The detached supporting belt is simply a canvas band, 3 inches wide, also made of girthing, strongly secured at each end to a handle of a form convenient for grasping, and is 4 feet in length. Its weight is 11 oz.

The following is the intended method of using this form of conveyance, given by the manufacturer and inventors, Messrs. Fischer:—

"The board is placed so as to rest on the small of the back of the bearer. The shoulder-belts are adjusted in the manner of a pair of braces, forming a cross behind the bearer's back, passing over his shoulders to be secured to the adjoining short straps by the buckles, and leaving the chest free. On taking up a patient, the bearer is to kneel down on one leg, keeping the other leg stretched out. One or two men then lift and place the patient in a riding position on the board. The loose supporting belt is adjusted under the patient's arms, and its handles are given over to the bearer. This belt serves to secure the patient in his position while the bearer is rising from his knee, and also during the transport." On arriving at his destination the bearer is to go down on his knee again, and the patient taken off in the same manner as that by which he was assisted upon the seat at starting." (See Drawing C, No. 3.)

The following points were noted in the experiments made with this appliance:—

1. It is not practicable for the bearer upon whose back the appliance is placed to help in putting a disabled patient upon it. Even in case of the bearer being a strong man, and the patient neither heavy nor so disabled as to be prevented from taking his place upon the appliance himself, still the bearer is then only able to rise from the kneeling posture with very great exertion, and with a considerable risk of losing his balance, and thus of injuring both himself and the patient. But if the patient, once placed upon the bearer's back, be a heavy man, and the bearer only of average strength, then the latter is not able to rise without assistance from the kneeling position at all. The addition of a strong stick for the support of the bearer is almost indispensable.

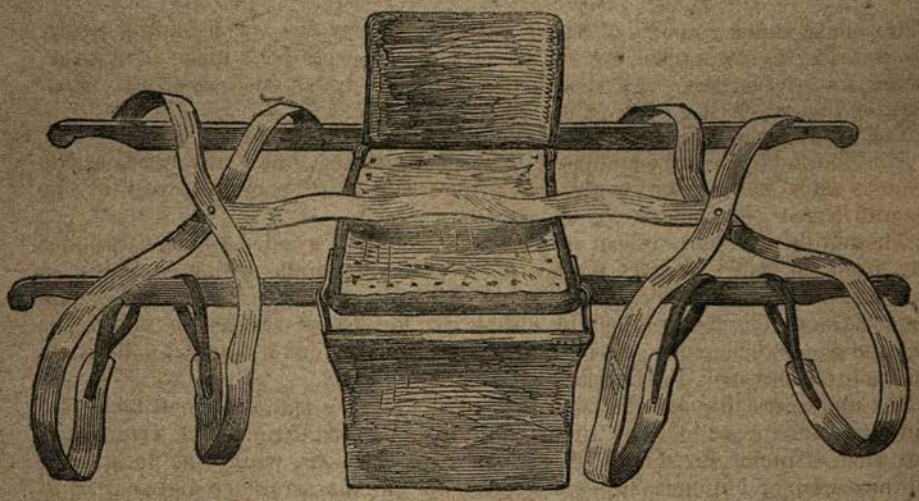
2. When the bearer is in the erect position, no wounded man could get upon the appliance. This could only be accomplished by a man in possession of the full use of all his limbs, and even then only with considerable exertion.

3. Two bearers are required to place the patient upon the appliance, the apparatus thus employing three men before the bearer can start with the patient on his back

4. When the patient has once mounted the seat the bearer finds the use of the appliance convenient. He could march farther with a patient sitting on the seat than with one placed on his back without it. After a short time, however, a good deal of pressure upon the shoulders is experienced by the bearer. But if the patient is not faint, or has the use of one or both of his arms, then the bearer can temporarily release the strain on his shoulders by placing his hands under the patient's thighs, and supporting his weight in the ordinary way of carrying a person *en cheval*, while the patient assists in securing his own position by embracing the bearer's chest with one or both of his arms. On the other hand, if the patient is faint, or so wounded as to be unable to grasp the bearer, then the latter must continue to employ his hands in holding the patient on his back by the canvas strap designed for that purpose.

5. If the bearer happen to slip he is liable to fall back upon the patient in consequence of the position and weight of the latter. A strong staff in the bearer's hand is almost essential to enable him in such an emergency to preserve his balance. In case of a fall in any direction it is extremely difficult for the patient to disengage himself on account of the width of the board and its ends projecting beyond the patient's thighs. He would have to make a circular horizontal sweep with both thighs simultaneously in order to get

D. No. 1.



Cacolet, or Chair-litter, to be carried by two bearers marching abreast or in file.

clear of the board. At the same time the width of the board from end to end could not well be reduced without impeding the security and convenience of the patient when once he is placed upon it. This is one of the difficulties which applies with equal force to the case of a patient trying to get on the board unassisted.

6. In dismounting, even in placing a patient on a bed from off the appliance, no little difficulty is met with unless the assistance of two other bearers can be procured. To place a patient safely on the ground from off the appliance without additional help is almost impracticable.

7. The appliance could be adapted to be *worn* with the knapsack, without, and in lieu of, the ammunition pouch; but as soon as the appliance would have to be *used* for the conveyance of a patient the knapsack would have to be taken off and left behind.

On considering the various practical points enumerated above, all of which were observed during the experiments made at Netley with this contrivance, the conclusion has been arrived at that the necessity of the additional aid required for its use neutralized its alleged advantage as regards economy of labour; and that the other objections adverted to above preclude it from being recommended for general use in the British military service.

D. *Cacolet, or Chair Litter, to be carried by two bearers marching abreast or in file.*

(No. 4 in Messrs. Fischer's Catalogue.)

This contrivance consists of three principal parts, viz., (1) a folding seat, supported (2) by two poles or shafts, and (3) of cross-belts made of canvas girthing for two bearers. All these parts are securely fastened together. The weight of the whole is 17 lbs. (See Drawing D, No. 1.)

The following is a description of the above-mentioned parts:—

(1.) The *folding seat* is composed of three divisions; one for supporting the patient's back, the second for the seat proper, the third part for a rest of the legs and feet of the patient.

The middle division, or seat proper, is formed by a wooden frame, 19 inches from front to back, and 16 inches across, within which strong webbing is interlaced; over this webbing a covering of strong canvas is stretched. The frame of the seat is firmly fixed by screws to the *upper* surface of the front pole, and the *lower* surface of the rear pole, giving thus a slight inclination from before backwards to the seat.

The uppermost division, or back part of the folding seat, is formed by a pair of hinges, each of which has a long as well as a short arm. The two short arms, each 4 inches in length, are screwed to the seat, while the long pair, each measuring 11 inches, support a piece of canvas stretched between, and covering them. These hinges enable the back to fold down upon the middle, horizontal, division of the seat. Two small iron crutches fixed to the rear pole keep the back of the seat steady when it is raised.

The third and lowest division consists of a light iron frame 19 inches long, and about 16 inches broad, with stout canvas stretched over it, and is made to fold nearly perpendicularly downwards so that the thighs of the patient may rest against it. Two small sloping blocks of wood are nailed to the front pole, to act as stops to this division of the seat when it is lowered, and to prevent it from passing too far backwards. The uppermost bar of the iron frame is securely attached by hinges to the woodwork of the horizontal part of the seat proper, the bar itself forming the pin of the hinges. When closed, this division of the seat is folded over upon the seat proper, and overlaps the folding back part or uppermost division.

(2.) The *poles*, or shafts, are made of light wood, 4½ feet long, 1 inch broad, and 2½ inches deep, and taper off at both pairs of ends so as to form handles. The dimensions between the poles are those given already of the seat proper.

(3.) The girthing *cross-belts*, four in number, are each attached by one of their ends to the near pole, two on each side of the canvas seat, and two at the extreme ends of the pole near the handles. The other two pairs of ends terminate in leather straps furnished with buckles and holes, forming one loop each, capable of being slid on and off the front pole at pleasure. By the

same means the belts can be lengthened or shortened, so as to be adapted to the different heights of different bearers. The two belts on each side of the seat are connected in such a way that each pair can at once be passed across the back and shoulders of its respective bearer, while the looped ends are adjusted one to each end of the front pole. A fifth belt connects the two pairs of cross belts, and acts as a rest for the shoulders of the patient who is carried on the seat.

This appliance is intended to be used in the following manner:—

The two bearers stand within the poles with the patient sitting on the seat between them. In marching, the bearers and patient look in the same direction, *i.e.*, the bearers move abreast with the patient, not one following the other, as in the case of ordinary stretchers. The alleged advantage of this arrangement is, that it enables the bearers to see the path before them, and to select their footing if they have to carry a patient over very rough and broken ground. The girths and straps are intended to lessen the fatigue of carrying their burden, and to allow the bearers to have their arms free, as the weight of the patient is thrown mainly on the shoulders of the bearers. The hands can be used at pleasure to steady the pole in front. (See Drawing D, No. 2.)

Should the bearers choose to carry this stretcher in the ordinary way of carrying stretchers, they can do so; but in that case they would not be able to use the shoulder straps, as they, being fixed to the poles, are only adapted for marching abreast. (See Drawing D, No. 3.)

The results of the experiments to which this contrivance was subjected were found to be as follows:—

1. To place a disabled man upon the seat, the employment of a third person, independent of the two bearers appointed to carry the cacolet, is absolutely necessary. Such assistance cannot be dispensed with, even in case the cacolet be placed on the ground and the patient in a condition to seat himself with his legs extended horizontally; for the bearers are unable, after lifting the conveyance up, to take their proper position or to adjust their shoulder-belts by themselves.

2. After the bearers are in position, a heavy person can be carried in this conveyance, in a sitting position, with great ease, and both bearers can see the path before them.

3. The conveyance does not admit of the patient being carried in a recumbent position.

4. The shoulder straps are so fixed that they can only be used by bearers marching abreast, and are not capable, as at present arranged, to be made use of by bearers marching in file.

5. This conveyance is not adapted for narrow paths, and would expose both bearers and patient to much inconvenience and delay during a march along ordinary roads crowded by people or vehicles, owing to the space required for the passage of three men ranged abreast.

6. The bearers cannot wear their knapsacks at the same time that they carry the litter, provided they use the shoulder-straps.

In conclusion, as the stretcher in ordinary use demands only the service of two bearers to place the patient on and off it, as well as during the transport; as it admits also of the patient being in the recumbent position; as it is at the same time simple in construction, more portable, and more generally applicable to the various exigencies of military service: the cacolet-stretcher constructed by Messrs. Fischer & Co. cannot be recommended as a substitute for it.

Nor does Fischer's chair-litter possess, even under the special circumstances for which it professes to have been particularly designed, any such marked advantages as to justify a suggestion for its adoption in lieu of other modes of transport capable of effecting the same objects, and included among the articles of field equipment officially authorized in this country.*

* I have seen a drawing of this form of conveyance, in which the straps were arranged differently from the manner described above. My remarks are, however, necessarily confined to the arrangement in the pattern forwarded by the manufacturer to Netley.—T. L.

D. No. 2.

The Cot-litter carried by bearers marching abreast.

D. No. 3.

The Chair-litter carried by bearers marching in file.

[Since the preceding paper was set up in type the following description of a Brancard Roulant has been received from Professor Longmore, and is added here at his request.]

Brancard Roulant.

M. Henri Arrault, of Paris, who is well-known as the inventor of numerous articles of field equipment for the medical service of armies, has lately invented a stretcher on wheels, which he has called the *brancard roulant*, or rolling stretcher. It consists of a stretcher, closely resembling the ordinary stretcher of the French service; adapted to wheels in such a way that it can be either rolled over the ground or carried by the hands of bearers at pleasure. One of these brancards roulants has just been received at Netley, and the following is a short description of this appliance.

It is composed of two principal parts:—

(A) The stretcher.
(B) The wheels and axle.

(A) The stretcher consists of two side poles and two traverses, made of wood (beech), and a canvas support stretched within them. The canvas is securely and permanently nailed to the two side poles, but is free at the head and foot borders. A canvas loop is attached to the middle of each of these free borders, and is intended for one of the wooden traverses to be passed through it. Each traverse, when employed to keep the canvas stretched out for use, is further secured in its situation by two small iron bolts placed at its two ends, and arranged to pass into two small iron eyes at corresponding positions in the side poles. When thus put together, the canvas and its framework form a litter, which does not permit of any bellying of the canvas, or doubling of the side poles upon a patient that may be placed upon it.

Near one end of each side pole, at about six inches from the handle, is an iron support, or foot, which assists in supporting the stretcher when it is placed upon the wheels. These iron feet can be readily raised and secured within supports provided for them on the outer aspect of the two side poles. They then remain in close proximity with the side poles.

(B) The wheels are 27 inches in diameter, and of ordinary construction. They are connected by an iron axle of sufficient length to admit of the stretcher being connected with it, and at the same time lying conveniently within the two wheels.

The connexion between (A) and (B) is thus obtained. Near the middle of the under surface of each side pole of the stretcher is a T-shaped piece of iron, the cross part being firmly secured to the pole, the tongue part being left projecting. Near each end of the iron axle is a small elevated piece of iron, furnished at its upper part with a square opening, adapted for receiving the tongue of the T-shaped piece of iron just described. When the stretcher is placed on the wheels, all that has to be attended to is that the tongue on each side is inserted into its corresponding receptacle on the axle; the connexion is then secured by an iron pin being passed laterally through certain openings which exist both in the receptacle and the tongue at a corresponding level. When the stretcher is bolted by these means to the wheels and axle, the whole appliance can be lifted off the ground together without any risk of the parts (A) and (B) becoming detached from each other.

The stretcher can thus either be employed as an ordinary stretcher without the wheels, or on being connected with the wheels, an operation which is very easily and quickly effected, can be either drawn or pushed as a wheeled conveyance. The stretcher is as readily removed from the wheels as it is placed upon them.

The weight of each of the several parts, on being weighed at Netley, was found to be as follows:—stretcher, 21 lbs. 14 ozs.; the two wheels, 23 lbs.; the axle, 8 lbs. 11 ozs. The weight of the whole is, therefore, 53 lbs. 9 ozs.

The "brancard roulant" is simpler in construction than any of the hand

wheel conveyances which have been lately brought to notice, and appears to answer well the several purposes for which it has been designed; but its value as a field appliance can only be fairly and fully reported upon after sufficient practical trials of its qualities have been instituted.

M. Arrault after explaining that his object was to preserve the advantages of the stretcher, at the same time to give to it the mobility and rapidity of action, together with economy as regards attendants, realized by mule-cacolets, thus describes his invention:—

"The stretcher, which is of ordinary form and dimensions, can be used alone. When mounted it is adapted to two light wheels by a very simple system of articulation, which maintains it at a certain distance from the axle. Two small bolts suffice to effect the junction.

"The whole is constructed with the necessary conditions of lightness and solidity, and of exactly uniform dimensions, so that the several parts can be put together without selection or delay. Two moveable feet within reach of the porter permit the appliance to be placed in a horizontal position, whether for placing a wounded man upon it or for halting. The qualities of comfort and celerity are fully provided.

"The *brancard roulant* may be substituted for the cacolets and stretchers in actual use with a saving of attendants and of animals. A single man pushing before him the stretcher will do the work of four bearers, at the least; or, in other words, five men will replace, with more comfort for the wounded, either twenty or twenty-four bearers, or two mules and a soldier of the Military Train. The economy as regards attendants is 75 per cent. in the first case, and is as much in the second case, considering the price of animals, and the difficulty of maintaining them in campaigning.

"One objection has, however, been urged against the invention. What will the porter do, alone with a wounded man, on meeting a brook or any of the ordinary obstacles which mules so easily pass over? The reply is easy. It is only necessary to cause two of the new stretchers to be moved away together, and then, in case of need, the two porters will mutually aid each other. The appliance when complete is so light that there is no necessity for taking the stretcher off the wheels on such an occurrence, it will pass easily wherever a stretcher can be carried by four bearers."

OBSERVATIONS ON THE INVALIDING AND DISCHARGING OF SOLDIERS.

By Staff Surgeon W. J. Fyffe, M.D., Assistant Professor of Medicine, Army Medical School.

The Queen's Regulations and Orders for the Army lay down six modes by which a soldier may be discharged from the service.*

1st. Discharge at the man's own request, whether by purchase, free, with or without gratuity or pension of any kind.

2nd. Discharge for disability.

3rd. Discharge with ignominy, on account of incorrigible character.

4th. Discharge of men who complete a service qualifying them for a pension while serving as loans to the Militia or Volunteers.

* Queen's Regulations and Orders for the Army, small edition, p. 208.

The instructions regarding the discharge of soldiers will be found in the Medical Regulations, pp. 62 and 103.

5th. Discharge claimed by men on the termination of their limited engagements.

6th. Discharge for any other special cause.

The authority for the discharge of soldiers is vested in the Commander-in-Chief,* "signified through the Adjutant-General, or the General Officer commanding in Ireland, signified through the Deputy Adjutant-General in Dublin, or that of the General or other Officer commanding on stations abroad, to whom such power may in certain instances be delegated; and no soldier can *demand* his discharge as a matter of right, either with or without pension, until the expiration of his engagement."

It is with the second class, almost exclusively, that Medical Officers have to deal; and as the duty of deciding on the unfitness for service of a soldier is a very important one, requiring, in many cases, long and patient observation, it may be desirable to offer some remarks on the subject, more especially as within the last few years great and important changes have taken place in the procedure of invaliding.

Before, however, entering upon a detailed description of this procedure, it may be well to take a retrospective view of the question, to consider the position of the soldier previous to the passing of the Limited Service Act in 1847, and to contrast the medical aspects of the duty of *invaliding then* with those which obtain at present.

Previous to the year 1847 the British soldier was enlisted for life. There was no possibility of his being able to leave the Army, by right of his own accord, on the termination of any particular period of service. His service, so to speak, was unlimited; and unless discharged by purchase, or with ignominy as an incorrigible character, there was only one other road by which he could pass again into civil life, and that road was by being found "unfit for further service on account of a physical or mental disability." A discharge by purchase was, and *is still*, obtainable by but few soldiers, as it costs from 10*l.* to 30*l.*, a sum, unless supplied by the bounty of friends, very difficult to be gathered together by any soldier, even with the most frugal care extended over many years.

Discharge with ignominy was open only to the bad and incorrigible, and affixed a stain of disgrace upon the character of the man for ever afterwards.

Hence it was that a soldier who sought his discharge from the service during the operation of the Unlimited Service Act, endeavoured to obtain it by being found permanently unfit for service by the Medical Officer of his regiment, for some real or alleged bodily or mental infirmity; and thus, under this system, malingering was of frequent occurrence, and the care and vigilance of Medical Officers were often exercised as much in detecting fictitious diseases, as in the treatment and cure of those which were real and unfeigned—a position always of great pain to a Medical Officer, one which altered entirely the aspect in which a physician regards his patient, which made him suspect every man who came before him with a bodily complaint, and was doubtless the cause of much suffering to many whose complaints, although in reality true, were believed to be false.

It is impossible to read the work of Mr. Marshall upon the Discharge of Soldiers, written even as late as the year 1839, without being struck by the fact that he regarded the detection of feigned diseases as one of the principal and most important parts of the duty of a Medical Officer in the invaliding of soldiers.

That the simulation of disease has decreased to an immense extent is due—

1st. To the period of the soldier's service being now limited to *ten* years, in the Infantry, and *twelve* in the Cavalry.

2nd. To the advances in medical science, by which the diagnosis of disease has been rendered more certain and accurate, and less conjectural.

Under the influence of the first cause, the soldier now knows that he can claim his discharge from the service as a matter of right, after the expiration of his term of service of ten or twelve years.* There is only one exception to this rule, namely, where General and other Officers on foreign stations have a

* Queen's Regulations and Orders for the Army, p. 204, par. 1.

discretionary power of retaining men for a period not exceeding *two* years, when the exigencies of the service require it.*

Under the influence of the second cause, diseases which were formerly obscure and difficult of diagnosis are now discerned with comparative ease.

The stethoscope, ophthalmoscope, and laryngoscope have rendered the diagnosis of those diseases which they were specially adapted to elucidate so clear that the simulation of this class of maladies is rendered almost an impossibility.

In the year 1847 the Act which provided that the soldier should enlist for life was abrogated, and the "Limited Service Act" † passed through Parliament, and came into operation. This Act limited the period of service of the soldier in "Her Majesty's and in the East India Company's service to *ten* years in the Infantry, and *twelve* years in the Cavalry, Artillery, or other Ordnance Corps, to be reckoned from the day on which the recruit shall have been attested, if he shall have stated himself to be then of the age of eighteen years, or if not, then from the day on which he will complete the age of eighteen years, to be reckoned according to the age stated in his attestation."

The effect of this Act, and of its amendments ‡ in 1855 and 1858, was almost completely to put an end to the feigning of disease on the part of the soldier for the purpose of obtaining a discharge.

It is true cases occasionally do occur even now where men endeavour to obtain an early discharge by simulating disease; but these cases are comparatively very rare. We seldom or ever hear now of men producing fictitious ophthalmia by the application of lime,§ corrosive sublimate, or tobacco ashes to the eyes; or where cataract was produced by the introduction of a needle through the cornea to the lens; or where distention of the abdomen was produced by drinking fermenting toddy, rice-water, and soap.

Under the *old system of unlimited service, almost every disease, at one time or another, had been feigned by the soldier. It was a thing of constant* occurrence for men to endeavour to "*work out*" a discharge. Soldiers instructed each other in the art; and even men, otherwise of good and steady character, have been known to undergo the most severe punishment, the most protracted and sometimes painful treatment, with the hope of wearing out the patience of the surgeon and obtaining a certificate of discharge.

At present it is rare to find a determined malingerer, and when he *is* found the sooner he is discharged from the service the better, as the saying of Marshall is as true now as when he wrote it, that "a disposition to malinger and to feign disease is one of the most disqualifying disabilities with which a soldier can be affected."‖

The organised system of invaliding soldiers which existed, with very slight modification, from the year 1830 up to 1863, was as follows:—

The two great head-quarters of invaliding were the Invalid Depôt at Chatham, and the Royal Hospital, Kilmainham, Dublin. To these places were sent all soldiers of the Line at home and abroad who had been found unfit for service at the head-quarters of their respective regiments by the regimental Medical Officers, and by the Senior Staff Medical Officer of the station from which they came.

The following was the procedure followed in discharging a soldier on account of unfitness for service under this system:—

It was of course by the regimental Medical Officers alone that the first opinion could be formed regarding the unfitness of a soldier for further service.

If, after long continued observation and treatment in hospital, the regimental surgeon arrived at the conclusion that a soldier was no longer fit for

* Queen's Regulations and Orders for the Army, p. 204. General Instructions for Discharge of Soldiers.

† An Act for Limiting the Time of Service in the Army, 21st June, 1847.

‡ An Act to amend the Act for Limiting the Time of Service in the Army, passed 27th February, 1855. An Act to revive and continue an Act amending the Act for Limiting the Time of Service in the Army.

§ Marshall on the Discharge of Soldiers, p. 99.

‖ Marshall, p. 92.

service, it was his duty to prepare the necessary documents laid down at pages 103, 104, and 105 of the "Medical Regulations." The detailed medical history, containing an exact statement of the disability in its nature, origin, progress, and extent, &c., for the information of the Principal Medical Officer at Chatham or Kilmainham, and a Medical report entered upon the third page of the invalid's discharge document, for the guidance of the Chelsea Commissioners in the allotment of pension.

These documents having been prepared, the invalid was next submitted to the inspection of the Principal Medical Officer of the station where he was quartered, who, if he coincided with the opinion of the Regimental Surgeon regarding the unfitness of the invalid, "approved" this opinion.

The preparation of these documents, and the decision of the regimental surgeon and Senior Medical Officer of the station, preceded by a short period the usual half-yearly inspection of the corps by the General Officer commanding the district. At this inspection the invalid was brought before the Inspecting General Officer, who approved of the previous proceedings, and by signing the return gave his authority to the invalid being sent forward to Chatham or Dublin for final examination and discharge.

This part of the procedure having been completed, and the necessary documents having been prepared, the invalid was next transferred from the Regimental Hospital to the Invalid Depôt at Chatham, or to the General Hospital, Dublin.

In the case of invalids from abroad, those men proposed for discharge were collected from each regiment serving in the Command, and sent home by a transport, landed at Gravesend, and then brought to Chatham, where they were inspected; and those men requiring immediate medical treatment were at once admitted into the General Hospital, Fort Pitt, leaving the remainder, consisting either of men who had completed the term of 21 or 24 years' service, and who required no medical treatment, to be quartered in the Invalid Depôt at St. Mary's Barracks, where their cases were finally disposed of by the Principal Medical Officer and the Chelsea Board.

All invalids, therefore, both from home and foreign stations belonging to the Line, were thus disposed of. The exceptions to this rule were in the cases of soldiers of the Guards, Royal Artillery, and Royal Engineers, who were invalided and discharged at the head-quarters of their respective corps, *unless* in the cases of those suffering from mental diseases, who, with the exception of the household troops only, were admitted to the lunatic wards in Fort Pitt.

Following then the procedure adopted after the transfer of the invalid from his regiment to the General Hospital at Chatham or Dublin, the course was as follows:—

1st. The admission of the invalid into either the medical or surgical divisions of the hospital, and his primary examination by the Staff Surgeon of the division.

The details of this examination were recorded by this Officer in the divisional admission and discharge book, a brief statement was recorded of the patient's previous medical history taken from the documents already described, namely, his Detailed history and Medical histories sheet; the invalid was then placed under observation and treatment for a longer or shorted period, according as his case seemed to require. The Divisional Staff Surgeon then recorded his opinion as to the fitness or unfitness of the invalid for further service in the admission and discharge book, giving his reasons for arriving at either of these conclusions. A similar course was adopted in Dublin in the case of invalids from regiments serving in Ireland, and this information having been thus collected the invalid was next sent before the Principal Medical Officer for his final decission.

The Principal Medical Officer, although entirely responsible for the final decision regarding the unfitness of the invalid, had before him as a guide the recorded opinion of three Medical Officers of experience, viz., the opinion of the regimental surgeon as recorded on the detailed medical history; the *Medical Report* on the third page of the soldier's discharge document, approved by the Senior Medical Officer of the station from whence he came; and finally the

opinion of the Divisional Staff Surgeon, as recorded in the General Hospital admission and discharge book.*

The opinion of the Principal Medical Officer in these cases was always *final*; if he considered the invalid unfit, he confirmed the opinion of the regimental surgeon in the space allotted for that purpose on the third page of the discharge document; if, on the other hand, he considered the case doubtful, the invalid was sent back to the wards of the General Hospital for further observation and treatment, when after the lapse of a reasonable period he was again brought before the Principal Medical Officer, who either decided upon his unfitness and final discharge, or else recorded his opinion of his ability to return to duty, in which case the soldier was discharged from the hospital for the purpose of rejoining his regiment.

In case, however, that the opinion of all the Medical Officers who had previously examined and observed the invalid, concurred in the belief of his unfitness for further service, the invalid was next brought before the officers appointed to represent the Commissioners of Chelsea at Chatham and Dublin.

This examination was conducted by two officers deputed by the Chelsea Commissioners to examine the invalid with a view to his claim for pension.

These officers were the Senior Surgeon of Chelsea Hospital, and the Secretary to the Chelsea Commissioners.†

It was the duty of these gentlemen to examine into the records of service of the invalid, and to report to the Chelsea Commissioners upon the claims to a pension which the soldier possessed on account of his length of service, wounds, and distinguished conduct, or the reverse. The object of the examination of the invalids by the Senior Surgeon of Chelsea Hospital was not for the purpose of deciding upon his discharge, which had already been done by the Principal Medical Officer, but for the purpose of guiding the Chelsea Commissioners in awarding the amount of his pension.

This examination was held at St. Mary's Barracks, Chatham, and a similar one was held at Kilmainham, in Dublin, every fortnight, or oftener when necessary. A report was then made by these Officers to the Chelsea Commissioners, who decided upon the invalid's claims to pension, after which he was finally discharged from the service.

To recapitulate then. The invalid was subject to the following examination, extending sometimes over many months in doubtful cases, before his discharge:—

1st. Observation, treatment, and decision of Regimental Surgeon.

2nd. Examination before a Medical Board, of which the Principal Medical Officer of the station was President.

3rd. Examination and treatment after his transfer to Chatham or Dublin, by Divisional Staff of the Hospital.

4th. Examination and final decision by Principal Medical Officer at Fort tt or Dublin.

5th. Examination by Medical Officer of Chelsea and Secretary to Chelsea Commissioners.

6th. Settlement of claims by Chelsea Board, and final discharge.

Such then was the organised system of invaliding previous to the opening of the Royal Victoria Hospital, Netley, in 1863, and this system included in its operations all invalids both from home and foreign service, with the exceptions already mentioned, namely, the Household Troops, Royal Engineers, and Royal Artillery.

The causes which led to the modification of this system, were:—

1st. *Its cumbrousness.*—Long and useless delays took place at the regimental head-quarters. There was difficulty, if not impossibility, of disposing of the invalid at any other period than at the usual half-yearly inspections, and

* The object of these repeated examinations was for the purpose of protecting the public against the expense entailed by the discharge of soldiers from insufficient causes. Regimental Commanding Officers are sometimes desirous of getting rid of men of ungainly appearance from the ranks, &c., the procedure through which the invalid had to pass acted as a check on the invaliding of men on light grounds.

† In 1830, invalids ceased to appear personally before the Commissioners at Chelsea, and the Officers mentioned above were appointed by them to examine and report upon the invalids.

it frequently occurred that men who had become quite unfit for further service were kept in their regimental hospitals, encumbering the wards, impeding the movements of the corps from one quarter to another, and burdening the public with expense.

2nd. On account of the procedure being so *tedious*. It involved *six* separate inspections and examinations by Medical Officers. It must be manifest that the Medical Officer who has most opportunity of judging of the fitness of a soldier for service is the regimental surgeon; the soldier is constantly brought under his notice and observation; he sees him daily on parade, and notices his efficiency in the ranks, and his ability to carry his arms and accoutrements. On the line of march he has ample opportunity of testing his powers of endurance in this respect. From the regimental records he knows his character, habits, and whole history since he entered the corps, and the records of the regimental hospital place him in possession of the soldier's entire medical history from the date of his joining.

3rd. The procedure was *expensive*. As before observed, men were often kept for lengthened periods waiting for the proper opportunity for discharge, saddling the public with expense, and taking up the places of efficient soldiers.

Again, the process was expensive in the movement of large bodies of invalids from various parts of the country to an invalid depôt.

Lastly. The invalid depôts themselves were found to be places productive of much mischief to the men in a moral point of view.

When a large number of invalids from various regiments were congregated at such a depôt as that which existed at St. Mary's Barracks, Chatham, vice and intemperance were found to prevail to a large extent. The men lost their "esprit de corps." The usual strict regimental discipline could not be kept up among soldiers of various corps, many of whom were in precarious health, or worn out from long service, and who expected in a few weeks at least to be free from the restraints of military life altogether, and who therefore frequently fell, even in their short stay at the depôt, into reckless dissipation.

This was perhaps more the case with young soldiers who had little or nothing to hope for in the way of pension, than with men of long service and previous good conduct, who by any flagrant misconduct at the depôt might compromise their prospects in this respect.

Such were some of the causes which led to the modification of the old system of invaliding, and to the establishment of that promulgated by the Horse Guards' order, dated the 4th of April, 1863.

The following is a copy of the order abolishing this system of invaliding and establishing the one at present in operation in the service.

Invalids.

1 1863. GENERAL ORDER, No. 824.

Horse Guards, S.W., 4th April, 1863.

The Royal Victoria Hospital at Netley, having been now organised and established under the approval of Her Majesty, the following instructions are published for general information, by order of His Royal Highness the Field-Marshal Commanding-in-Chief.

The Invalid Depôt at Chatham, and the Convalescent Hospital at Yarmouth, having been broken up, the Royal Victoria Hospital at Netley will in future be the general place of reception for invalids of all branches of the service arriving from foreign stations. That hospital, with the General Hospital at Dublin, will respectively receive doubtful cases only occurring in districts at home.

The Lords Commissioners of the Admiralty have issued the necessary instructions to their agents at Colonial stations respecting the dispatch of invalids for Spithead (Portsmouth), and the Secretary of State for India has given similar orders respecting embarkations from that country.

The Lords Commissioners of the Admiralty have also made arrangements for the transfer of invalids and insane men to Netley from ships anchoring at Spithead.

The Major-General commanding the South-Western District at Portsmouth will superintend the transfer of invalids, and will himself dispose, under orders from head-quarters and existing regulations, of all "time-expired men," convicts, or others not being invalids who may arrive at that port; officers

commanding on board ships will, therefore, give over the invalids and insane men under their charge, and the documents connected with them, to the Commandant at Netley, the other non-commissioned officers and men, &c., &c., to the Staff Officer at Portsmouth, appointed by the Major-General commanding to receive them, and all the documents connected with non-commissioned officers and men sent home from foreign stations should be prepared and kept separately, with careful reference to these arrangements.

In order to secure regularity and to prevent delay in the adjustment of the accounts of parties of invalids and others arriving from foreign stations, it is expedient that the officer in command should be instructed to cause, when practicable, the acquittance roll to be signed by each man before any individual quits the ship at Portsmouth. The officer should, if possible, sell while on board the kits of men who may have died on passage. He should likewise receive from the Captain of the ship whatever amount of "temperance money" may be due to the men, and deliver the same to the Paymaster at Netley.

The system of sending soldiers found unfit for service at home stations to an invalid depôt twice a year, viz., after each half-yearly inspection, is to be discontinued, and whenever a man is considered by his commanding officer and regimental medical officer to be unfit for the service, an application is to be made to the General Officer commanding the district in which he may be serving for his removal to the head-quarters thereof, to be disposed of in ordinary cases by the General Officer and Principal Medical Officer of such district, after having been kept under the observation of the latter for such time as may be necessary to enable him to form an opinion upon the case. He will subsequently be examined by a Medical Board for final decision, the President of the Board, if possible, not being under the rank of a Deputy Inspector-General of Hospitals.

In every doubtful case General Officers should recommend, when submitting them to the Adjutant-General, or, if in Ireland, to the Deputy Adjutant-General at Dublin, that the invalids concerned be removed to Netley or Kilmainham for further treatment.

Should the Board in ordinary cases pronounce the men unfit for further service, the General Officer commanding will then come to a decision, with the assistance of the Principal Medical Officer, and transmit to the Adjutant-General, or, if in Ireland, to the Deputy Adjutant-General at Dublin, for the final approval of the Field-Marshal Commanding-in-Chief, a return in two parts (for which forms will be supplied by the War Office on application), one, of those men proposed for discharge, the other, of those to be either returned to their respective corps as convalescents, or sent to Netley or Kilmainham for further treatment as doubtful cases.

General and other officers will bear in mind that the Royal Artillery and Royal Engineer branches of the Adjutant-General's department are distinct from each other, and from that appertaining to the Cavalry and Infantry.

The above Return will be rendered, therefore, separately in each case. The General Return will be prepared in regimental order.

On receiving an authority for the disposal of these classes respectively, the discharge documents of the first-named, for which an improved form is about to be issued, are to be duly completed and transmitted to the Adjutant-General or to the Deputy Adjutant-General at Dublin, as the case may be, for confirmation, with a view to their being submitted to the Chelsea Board.

The Right Honourable the Secretary of State for War has assented to the recommendation of His Royal Highness that when soldiers, borne on the strength of their corps as married men, are temporarily removed to the head-quarters of districts or to a general hospital, their wives and families, who will remain with their corps until their cases are decided upon, shall receive the same allowances as are usually granted to women and children whose husbands and fathers are separated from them on account of their being in camp.

Those invalids who under the foregoing instructions are sent to Netley or Kilmainham Hospitals are to be reported upon in similar Returns, of unfit and convalescent, as those prescribed for district invalids, duly signed by the Governor and the Principal Medical Officer.

In order to carry out the foregoing instructions at stations not in districts

or divisions, the invalids at Maidstone will be disposed of by the Major-General and Principal Medical Officer at Chatham.

Those at Hounslow will be sent to Woolwich to be similarly treated.

The Household Cavalry will be inspected in London, and reported upon by the Inspector-General of Cavalry and a Deputy Inspector-General of Hospitals from head-quarters.

The Household Infantry, or other Infantry in London, will be inspected by the Major-General commanding the Foot Guards and a Deputy Inspector-General of Hospitals from head-quarters, who will have full authority to visit the hospitals and inspect the invalids.

The invalids at the five stations specified in the margin will be inspected and disposed of by the Commandant and Principal Medical Officer at Colchester.

Those at Pembroke and at Bristol by the General Officer and Medical authorities at Devonport.

As the orders now given dispense with the personal examination of invalids by the Secretary, and Medical Officer of the Royal Hospital at Chelsea, it becomes more important than hitherto that the discharge documents should contain in them every information necessary for the guidance of the Commissioners in assigning pensions, either permanent, temporary, or conditional.

His Royal Highness the Field Marshal Commanding-in-Chief will, therefore, hold commanding officers of regiments and medical officers responsible that no discharge documents are signed by them which do not give a full and perfect record of the soldier's service at home and abroad, his wounds, medals, and badges, as well as his general conduct and character, and besides the immediate cause of disability for further service, the effect which climate, wounds, or his own habits have had on his constitution, should be distinctly stated.

The new forms of discharges must be accurately filled up, and it must be remembered by those who compose the Boards that any omission or negligence in stating the soldier's case may prove a serious detriment to him on one hand, or an imposition on the public on the other.

By command,

(Signed) JAMES YORKE SCARLETT,
Adjutant-General.

Briefly to recapitulate, the effects of this order were :—

1. Separation of the invalids of the army into two great classes, *home* and *foreign*.
2. Abolition of the system of invalid depôts.
3. Establishment of one distinct receptacle for foreign invalids alone, with the exception only of doubtful cases at home.
4. The abolition of the system of invaliding from regiments after the usual half-yearly inspections.
5. The allotment of certain stations not in districts or divisions for the disposal of invalids from regiments stationed in the vicinity.
6. The abolition of the examination by the Secretary and Medical Officer of Chelsea Hospital, and the vesting of their powers in the hands of the Governor and Principal Medical Officer of Netley for foreign invalids and "doubtful" home cases, and in the hands of the General commanding the district and Principal Medical Officer in the case of invalids at home.

This order being now in full force in the service, I proceed to describe in detail the present system of invaliding both at home and abroad.

And, first, with regard to invalids from regiments at home.

The procedure as regards home invalids may be described under the following heads :—

1. Decision of the regimental surgeon and Commanding Officer respecting the unfitness of a soldier for further service for some physical or mental disability.
2. Enumeration and description in detail of the necessary documents to be prepared by the surgeon in bringing forward the invalid for discharge.

3. Removal of invalids to the head-quarters of the district for disposal by the General commanding and the Principal Medical Officer.

4. Final decision by Medical Board.

5. Exceptions to the above rule with regard to "*doubtful cases.*"

6. Special documents to be prepared in cases of invalids suffering from mental disability.

1st. With regard to the decision of the regimental surgeon and Commanding Officer. The Commanding Officer is, of course, in this matter guided by the opinion of the surgeon.

On the latter rests the entire responsibility of selecting those men whom he considers for medical reasons to be no longer fit to perform the duties of soldiers.

The surgeon must be prepared to justify this opinion upon very clear and distinct grounds. His responsibility in this matter is of a twofold character.

1st. He is bound not to allow the regiment to be encumbered by men who are not likely to be able ever to discharge their duties.

2nd. He is to take care that soldiers are not brought forward for discharge upon light and insufficient grounds; and their services thus lost to, and expense entailed upon, the public.

As before observed, the surgeon of a regiment has manifestly opportunities of judging of the efficiency of a soldier which no other officer possesses; he is constantly brought into contact with him, and he can extend his observation of any particular case in which he entertains a doubt, over a very considerable period of time,

Thus, by a knowledge of the character of a soldier, by protracted observation of his case in the regimental hospital, he is able to bring a large number of concomitant circumstances to bear in arriving at an opinion regarding his unfitness for further service.

One of the main duties of a regimental surgeon is to keep the corps committed to his charge in an efficient condition. In order to ensure this, he must from time to time weed the ranks of those men who, from physical disabilities, are no longer able to discharge their duties.*

It must be remembered that a soldier should be able to perform all his duties. It is not enough that he may be considered able to do a part—the easy part—and to leave the more irksome duties undone.

Henry Marshall, in his excellent work, proposes three questions for the consideration of the Surgeon in bringing forward a soldier for discharge, viz.:—

1st. Does the alleged disability exist?

2nd. Does it disqualify the soldier for military service?

3rd. Is it incurable, or will it render him permanently unfit for service?

Happily, now, there does not exist the same difficulty in proving satisfactorily the existence of an alleged disability, which was so frequently the case when Marshall wrote, for the reasons before adverted to, that the soldier has now no great object in view in feigning a disability for the purpose of obtaining a discharge upon purely medical grounds. Still it does occur occasionally that men will make the attempt to obtain a discharge in this way, and it therefore becomes the Medical Officer to exercise the greatest vigilance in preventing a fraud of this description, and if he has any doubt on the subject, the soldier should be subjected to the most careful examination and watchful scrutiny extended over a longer or shorter period.

The question of the *unfitness* of a soldier for further *service* ought not to be hastily determined.

When the disability is clear and decided, such as in the case of the loss of a limb, in well marked phthisis, or valvular disease of the heart, the Medical Officer can have no hesitation, and under such circumstances the sooner the invalid is brought forward and discharged the better; but where obscurity exists, where diagnosis is difficult, and where the character of the soldier gives some reason to suppose that he is seeking to be discharged; or again, where treatment offers some hope of restoring the man to efficiency, the Medical Officer must pause before he gives a decided opinion in the question, or takes any steps towards the preparation of his discharge document.

Senior Staff Medical Officers are very reluctant in any subsequent exami-

* Medical Regulations, p. 62: "Discharge of Soldiers," par. 3.

nation of an invalid to reverse the opinion of the regimental Medical Officer. They naturally feel that he has had by far the best opportunities of judging of the fitness or otherwise of the soldier, and they hesitate before disapproving of the decision of the Surgeon, founded as it is upon long experience and observation of the case. The opinion and the reasons for it, of the regimental Medical Officer should be therefore very clear and explicit, and should be justified by reasonable proof in the documents transmitted with the invalid. He must be able to show, not only that the disability is of a disqualifying nature, but also that there exists no likelihood of the soldier being restored to efficiency within a reasonable time.

Therefore, to form an opinion of the unfitness of a soldier for further service, requires a knowledge of the diseases to which soldiers are liable, and also an intimate acquaintance with their duties and habits. This can only be gained by experience.

What, then, constitutes "unfitness for further service?"

1st. The existence of any disease, injury, or mental infirmity, which renders the soldier unable to perform all the duties required of him.

2nd. The opinion, that after patient observation there is reason to conclude that no hope exists of his being restored within a reasonable time to efficiency.

The Surgeon having satisfied himself on these points, his next step is to communicate with the Commanding Officer, and obtain his sanction to the invalid being brought forward for discharge.

This having been obtained, the necessary discharge documents must be prepared in accordance with the instructions at page 103 of the Medical Regulations.

For each invalid must be prepared by the Surgeon the following documents:—

1st. Detailed history of the case for invaliding.
2nd. Medical Report, upon the third page of the Discharge Document.
3rd. Medical History Sheet.

Detailed Medical History for Invaliding.

This document is now prepared upon a new form (War Office Form 891), modified from that described at page 104 of the Medical Regulations, and the Medical Officers required to give full particulars of the case under *eleven* distinct headings.

The first four need no remark, as they explain themselves, and it is merely requisite to fill in the blank spaces with the necessary particulars.

5.—"*Disease or Disability.*"

Under this head, the Medical Officer is required to enter the name of the disease or diseases for which the soldier is about to be invalided. If the invalid should be affected with more diseases than one, the most prominent should be stated first, and the others subsequently. Each should be entered according to the statistical nomenclature.

6. "Its origin, date, progress, and extent, whether the same is the result of climate and military service, or constitutional infirmity and predisposition, or of epidemic or endemic causes, or has been excited or aggravated by intemperance or other vice, or by misconduct, or by two or more of these causes combined? If the disability be the result of accident, the circumstances under which the accident occurred, and whether on or off duty, should be stated."

In order to fill up satisfactorily this portion of the document, the Medical Officer should make search into the medical records of the hospital; he should examine the Admission and Discharge Book, the Medical Case Book, and the Medical Histories Sheet, in order to ascertain clearly from what cause the disease took its origin, how long the man has been suffering from it, how long he has been incapacitated from duty, and to what extent the disability prevents him from performing his duty.

In entering his opinion regarding the second clause of this heading, namely, whether the disability is the result of climate, &c., the Medical Officer should take into consideration the insalubrity of the climate in which the invalid has served, the period of time he resided there, and the nature of the military service performed.

Medical Officers cannot be too careful in filling up accurately all the details of this question contained in paragraph No. 6, and they are cautioned by

General Order of April 1863 to do so, in the concluding paragraph but one of the order referred to.*

With reference to the clause in this paragraph in which the Medical Officer is called upon to state whether the disability has been aggravated by intemperance or other vice, or by misconduct, or by two or more of these causes combined, he must exercise caution; probably he will know from his own personal observation whether the soldier is or is not habitually intemperate, but it may be well that he should ascertain whether the crime of drunkenness† has been frequently recorded against the invalid. With regard to syphilis as the result of vice, and as to its being stated as a cause of the aggravation of the disease, this should only be done when there are distinct and unmistakeable signs of constitutional or local syphilis existing in some form on the invalid's body at the time.

The fact of a soldier having been admitted to hospital several times during the period of his service for venereal disease, should not be stated as an aggravating cause of his disability, unless as already stated the symptoms of true constitutional syphilis in some of its forms are present, or that the origin of the disability from which he suffers, can be clearly traced to this cause.

With regard to the concluding paragraph of No. 6, namely, "*If the disease be the result of accident*, &c." It will be seen by an examination of paragraph 21, at page 214 of the Queen's Regulations, that when a soldier is permanently injured by an accident either on or off duty, a court of enquiry is to assemble in order to decide the question as to whether the injury was caused while in the execution of duty or not. This court of enquiry should assemble as soon after the accident as possible. Consequently, when a soldier has been admitted to a Regimental Hospital suffering from the result of injury received while on duty, which is calculated to disable him, or which may be suspected to be the result of a voluntary act, such as mutilation from the discharge of a firelock, the surgeon should report the circumstances to the Commanding Officer, and apply for a court of enquiry; the finding of the court should always accompany the discharge document of the invalid.

As these questions bear intimately on the decision of the Chelsea Commissioners, the medical and other officers cannot be too careful in stating in clear and distinct terms the opinion required.

7. "Description of gun-shot or other wounds, or injuries, which may have been received in action, or under circumstances contingent upon service before the enemy or otherwise, or by accident, or by his own fault. If wound or injury of distant date, the extent of inconvenience or discomfort continuing therefrom should be stated. (Marks of punishment inflicted for military offences, or of treatment for the cure of nervous and other diseases, should also be noted.)"‡

* See page 489.

† The written Reports by Commanding Officers and by the Surgeons of regiments in the invalid documents on the characters of soldiers, especially in regard to intemperance, are not unfrequently diametrically opposed to each other.

‡ Permanent pensions shall be granted to men discharged in consequence of being rendered incapable of further service by wounds or injuries received in action, according to the following scale :—

Rank.	First Degree. Men losing two limbs or both eyes from wounds, or being so severely wounded as to be totally incapable to earn a livelihood, and to require the assistance of some other person.		Second Degree. Men rendered incapable of further service by wounds or injuries received in action not of the First Degree.	
	From	To	From	To
	s. d.	*s. d.*	*s. d.*	*s. d.*
Serjeant	2 6	3 6	1 0	3 0
Corporal or Bombadier	2 0	3 0	0 9	2 0
Gunner or Driver, Sapper or Private	1 6	2 6	0 6	1 6

The pension shall be fixed according to the rates in the foregoing scale by the Commissioners of Chelsea Hospital, who will grant the lowest or the largest, or any

In the filling up this part of the document, the Medical Officer must be careful to state the exact nature of the wound or injury, and of the primary lesion resulting from it. If received in action, the engagement should be named.

With regard to the second clause, a careful description should be given of the consecutive effects of the injury, noticing the muscular motions interfered with, and the probable effect of the injury in preventing the man from earning or contributing to earn his livelihood.

The "circumstances contingent upon service before the enemy," may include any injury received while on duty of any kind, although not actually engaged, or any accident, such as the bursting of a rifle, or the explosion of a magazine, a fall from a horse, or the upsetting of a gun carriage, provided such injury shall not have been caused by the man's own fault.

Under the head of "Marks of Punishment" or "Treatment," the Medical Officer is to state if the invalid be marked with the letters D or B C; or if there be traces of corporal punishment; or if he bear marks of cupping, leeching, or of any other treatment leaving indications obvious to sight, and in what localities.

The reason for this will be stated further on.

8. "Any physical defects or results of previous injuries and diseases, though not immediately connected with the disability for which invalided, should be noticed, and such information given as may tend to elucidate any claim that may be founded on them."

This paragraph indicates the necessity which exists of great care being taken in the examination of the invalid, on the part of the Surgeon, before filling up the various questions in this document.

He should therefore be examined carefully and systematically from head to foot. The chest should be examined for cardiac or pulmonic disease, and the external surface of the body inspected for skin disease, rupture, or varicose veins; for although such affections may not form the *prominent* cause for which the invalid is brought forward for discharge, yet if such defects exist to any great extent they would give additional grounds for his claim to pension, especially if such can be shown to have been caused *in* and *by* the service.

9. "Full particulars of medical treatment of case up to date of invaliding. (In cases of invalids who have suffered from syphilis, state whether mercury has been given, and to what extent and in what forms.)"

Under this head should be noted the treatment adopted in the acute and chronic stage of the disease, and the effects of treatment. The object of eliciting this information is to enable the invaliding officer to form an opinion as to the nature and extent of the treatment which *has* been adopted, with the view of guiding him in a further attempt to render the soldier fit for service by using additional curative agencies.

10. "If previously proposed for discharge on medical grounds, state the date, the disability for which recommended for discharge, and the cause of remand to regiment. When proposed for discharge on account of nervous or other diseases not easily detected, give the reasons which lead to the belief that the soldier cannot re-enlist if discharged."

It frequently happens that when soldiers proposed to be invalided by Regimental Surgeons, especially from foreign stations, are sent to a general hospital at home, they either recover their health to a great extent after medical treatment, or as the result of the invigorating influence of a sea voyage, or from other causes; or the Principal Medical Officer may not consider the case as one fit for discharge, in which case the soldier is returned to his regiment or depôt with an opinion from the Principal Medical Officer as to the man's fitness for service. Under such circumstances the soldier is sent to

intermediate rate, according to the degree of the injury received, the length of the soldier's service, his character, number of distinguished marks in possession, or any peculiar circumstances attending his conduct at the time the wound was received, and in cases of gallant conduct in the field, a sum not exceeding 6*d.* a-day may be granted by the Commissioners of Chelsea Hospital on the recommendation of the Commander-in-Chief, with the consent of the Secretary of State for War, as Her Majesty's royal bounty, in addition to pension.—*Pension Warrant*, par. 7.

his duty, or if he persists in stating his inability to perform it, he is then placed under observation, and, if necessary, under treatment in hospital for a period of not less than six months.*

If the Surgeon should at the expiration of this term again bring him forward for discharge, then the first clause of this heading must be filled up.

With regard to the second clause as follows—"When proposed," &c., &c.—it will be necessary to offer a few remarks.

The re-engaging and re-enlisting of soldiers who have been discharged on account of disability during the first period of their limited service, is a fact not only officially recognized but encouraged, provided the re-enlistment shall take place within twelve months after discharge, and that he is not above thirty-four years of age.†

This of course presupposes that the disabilities for which they were discharged shall have disappeared to such an extent as not to interfere with their active duties as soldiers; and if any soldier presenting himself for re-enlistment, conceals or misrepresents the cause for which he was discharged, he forfeits all the advantages of such renewal of engagement, and shall not be allowed to reckon his previous services towards a claim for pension.

But while it is desirable to encourage the re-enlistment of soldiers, and thereby preserve to the Army men who are well trained and experienced, on the other hand the service is exposed frequently to the imposition of admitting a second time to its ranks soldiers who have been discharged on account of disabilities of such a nature as to render them quite unfit, but which, on account of their being obscure and difficult of detection, may escape the scrutiny of an examining Surgeon.

Every legitimate means, therefore, which can be used to protect the public from a fraudulent proceeding of this kind should be carried into effect.

The first professional duty of every Medical Officer has, or ought to have, for its main object the good and *cure* of the patients under his care.

Every other consideration should be subservient to this, and no sort or kind of treatment is justifiable which has not this for its aim and end.

But in dealing with cases of obscure deep-seated disease, not easily detected, but at the same time wholly disqualifying, such as those mentioned in the Medical Department Memorandum of the 30th July, 1859 (quoted further on), it is scarcely possible but that at some period during the progress of the case, opportunities will occur of pursuing such local treatment which, while it has for its main and principal object the benefit of the patient, will at the same time be such as to leave evidences of its having been adopted.

In the event of a soldier bearing such marks of treatment being discharged unfit for the service, and attempting to re-enlist as a recruit, these marks will be sufficient at once to attract the attention of an examining Surgeon, and are held to be sufficient grounds for refusing the admission of the alleged recruit into the Army.

It should be clearly understood to be the general rule that "marks of treatment" in themselves are a sufficient reason for the rejection of a recruit.

A case occurred recently in which a recruit bearing distinct marks of treatment, who had been passed by an examining Surgeon, was subsequently deemed ineligible by a Medical Board *solely* on account of his bearing these marks, not on account of these marks having led to the detection of any deep-seated disease. The Horse Guards authorities decided that the recruit should be retained in the service. It is manifestly desirable that such a conflict of professional opinion, as was shown in the opposite decisions of the examining Surgeon and the Medical Board in this case, should be avoided, and this can only be ensured by the rejection of recruits bearing these marks *at the primary examination*. Moreover, in the great majority of such cases there can be but little doubt, even if the disease itself for which the treatment was pursued be not capable of being detected, it still exists, either in a latent form, or has led to some consequences calculated to impair the man's efficiency as a soldier.

Much inconvenience and expense has often occurred from the re-enlistment of men wholly unfit for service; and the late Director-General of the Army Medical Department, being desirous of impressing upon Medical Officers the

* Medical Regulations, p. 105. † Pension Warrant, pars. 21, 28.

importance of guarding as far as possible against this, issued the following Memorandum, calling upon them to be careful that soldiers brought forward for invaliding should, unless their disabilities were clear and easily detected, bear distinct evidences that every means had been adopted in the way of local, as well as general treatment, which would tend to the restoration of the soldier to health and efficiency :—

MEMORANDUM.

Army Medical Department, 30th July, 1859.

Many soldiers of short service, who did not bear marks of medical treatment, having been sent to Chatham to be discharged, the Director-General begs to call the attention of Medical Officers to this subject, and to inform them that every soldier, before being brought forward for discharge on account of a medical disability, must bear the marks of treatment usually adopted in professional practice, to show that proper remedial means have been used to restore him to health before he is pronounced unfit for further service.

Soldiers are often invalided for lumbago, epilepsy, disease of the joints, and visceral affections, all of which, in the early stage, would have been much benefited by local depletion ; and it is to such cases that the attention of Medical Officers is specially directed, and not to those of advanced organic disease or of permanent deformity.

The Director-General recommends, where topical depletion is considered necessary, that cupping be resorted to, as it is a mode of treatment oftentimes more efficacious and always less expensive than the application of leeches.

(Signed) T. ALEXANDER, Director-General.

When the disability is of such a nature as to be plain and easily detected, such as in cases of rupture, extensive varicose veins, gunshot wounds, &c., there can be no difficulty in the Medical Officer giving an opinion as to his belief that the soldier cannot be re-enlisted ; but in diseases of internal organs, obscure affections of the lungs, heart, or abdominal viscera, or in cases of epilepsy, where the signs of disease are not well marked, although in existence, it is quite possible, as shown by frequent examples, for a discharged soldier to re-enlist in another corps, obtain the bounty, and again, after a short interval, present himself to the Surgeon with the old complaint for which he had been originally invalided.

The grounds then upon which a Medical Officer may state his decided opinion that a soldier if discharged cannot be re-enlisted, when proposed for discharge on account of nervous or other diseases not easily detected, are—

1st. Marks of punishment for military offences by the letters D or B C, or from corporal punishment.

Soldiers sometimes endeavour to erase or obscure the letters D and B C, and convert them into various devices. such as ships, flags, or flowers ; but an experienced Surgeon, in the habit of examining recruits, will generally be able to detect this attempted imposition from the position of the marks.

These marks are always to be found in the left axillary region, and in the position in which a recruit stands with his arms extended over his head during his inspection, these could scarcely fail to catch the Surgeon's eye, and if detected would of course cause the rejection of the so-styled recruit. Occasionally also the marks of previous corporal punishment can be detected on the shoulders, and would form a just ground for giving an opinion that the soldier cannot re-enlist. Recruits bearing distinct traces of flogging should invariably be rejected, as none but soldiers of the very worst characters are ever now subjected to corporal punishment.

* Dr. Cockburn, Royal Engineers, has related the following case to me, illustrative of this :—A Sapper reported himself sick at the Hospital of the Royal Engineers, Chatham, suffering from pain in the cardiac region. On stripping him the upper half of the body was tattooed over with every possible device—sailors, soldiers, women, crosses, flags, were scattered over the whole chest, back and front. A few days after, during re-examination, a ray of light fell suddenly on his left side, and in the centre of a coloured union jack the outline of the letter D was distinctly traceable, but it was so artistically obscured that no less than five Medical Officers of experience failed to detect it till the man was placed in a peculiar light.

2nd. The existence of indelible marks of treatment on some parts of the invalid's body.

The marks of *repeated blistering* will sometimes be sufficiently permanent to enable the Surgeon to state his opinion that the invalid if discharged is not likely to be re-enlisted; such marks would, in case the invalid presented himself at any future time for re-enlistment, induce the examining Surgeon minutely to investigate the condition of the organs over which such counter irritation had been applied, and thus lead to the discovery of a disability which otherwise might escape detection.

The marks left by the pustules produced by *tartar-emetic ointment*, often leave traces sufficiently clear to enable the Surgeon to give an opinion as to the improbability of re-enlistment, but there are no marks which will enable a Medical Officer to give this opinion so decidedly as those left by setons, leeches, and cupping.*

Dr. Crawford's observations upon this subject in his paper on the Physical Disabilities of Recruits, sufficiently indicate the importance that there should exist a clear understanding among Medical Officers of the Army that recruits presenting themselves with certain marks of treatment should be considered ineligible for enlistment.

He says, "Marks of cupping, or of setons, issues, &c., in certain localities are circumstantial evidence of specific affection of a disqualifying nature, *e.g.*, at the nape of the neck, they indicate previous cerebral derangement, epilepsy or the like; over the larger joint, synovitis, or acute rheumatism; over the chest or abdominal region previous inflammation, affections which frequently lay the foundation of organic disease. Above all, there is a large class to be found scattered over the country who having previously passed through the public service, and having been discharged for various causes, subsequently try to re-enlist. These are for many reasons well understood by military surgeons to be ineligible recruits, and the rules which exclude them ought to be carefully observed. In selecting recruits a preference should always be given to men who have not previously suffered from organic disease necessitating local treatment."†

Regimental Medical Officers ought, however, to bear in mind that treatment of this kind should always be carried into effect while the invalid is still an inmate in his regimental hospital, and before his transfer, in the case of foreign invalids, to Netley, or in the case of home invalids to the head-quarters of the district.

The regimental Surgeon has usually alone the opportunity of observing and treating the soldiers in the early and acute stage of their diseases, and it is in this stage especially that such means as cupping, leeching, the use of setons, or issues, are most likely to be beneficial to the patient.

After the men have been invalided and sent to a General Hospital when their diseases have assumed a chronic character, it can seldom happen that treatment of the nature referred to is any longer necessary or expedient.

At one time the operation of re-vaccination was performed on the left fore-arm of every recruit on joining a regiment, and this afforded means in many instances (from the vaccination being performed on one certain position of the body), of guiding an examining Surgeon to the detection of a soldier attempting to re-enter the service after having been discharged on account of disability; but owing to the numerous cases of unsuccessful vaccination, and others having occurred where dangerous diffuse inflammation followed the operation, this practice has been abandoned.

* When the chest is much covered with hair these marks are sometimes difficult of detection, as the following case mentioned to me by Dr. Cockburn, R.E., exemplifies:—A Recruit was objected to by a Regimental Surgeon as suffering from phthisis. The Medical Board returned him to his regiment as having no sign of this disease, and as being likely to re-enlist, as he presented no marks of treatment. Some months after he came into hospital, and in the course of treatment it was necessary to apply a mustard poultice to the chest. This part of the body was found thickly covered with hair; on removing the hair marks of cupping were discovered.

† Observations on the Physical Disabilities of Recruits, by Thomas Crawford, M.D., Staff Surgeon, Head of the Medical Branch, Army Medical Department. Army Medical Report, 1862, p. 530.

Further on it will be seen that in signing the declaration of his opinion on the 3rd page of each soldier's discharge document (W. O. Form 83). The Principal Medical Officer, who inspects the invalid previous to discharge, is obliged to certify that the disability "permanently incapacitates him for the active duties of a soldier, and that he cannot re-enlist if discharged."

It is manifest that the Principal Medical Officer cannot sign such a declaration, unless the invalid bears evidences of a permanent physical injury, or of some organic disease or other disability *easily detected*, or, in case such disability is obscure, and difficult of detection, that he bears such marks as are sufficient to indicate that the man has already been under medical treatment for some disqualifying disease.

Hence the importance that some of the methods of treatment above referred to, should be carried out in the Regimental Hospital before the soldier is brought forward for discharge.

When cases of difficulty arise from the Principal Medical Officer of a district, or invaliding hospital, finding it impossible to certify that invalids cannot re-enlist if discharged, they are retransferred to their regiments or depôts for further observation and treatment, thus entailing unnecessary labour on all concerned.

No. 11. "State whether proposed for discharge on account of permanent unfitness for service, or at the expiration of first term of limited enlistment, on account of present inability to re-engage."

The first part of this heading explains itself. With regard to the second, namely, in the cases of soldiers about to be discharged at the expiration of the first period of their limited engagement on account of inability to re-engage.

It has been decided by the Horse Guards and War Office, that when the men who are desirous of re-engaging after the expiration of their first term, but who are found unfit to do so by the regimental Surgeon, they are to be discharged under what are termed "Dispensing Orders."

The general definition of Dispensing Orders will be found under the head of "General Instructions" for the discharge of soldiers, in the Queen's Regulations, par. 2, in which three classes of cases are given, where the usual authority for discharging a soldier may be dispensed with. The procedure in these cases would therefore be that when men of 10 years' service desirous of re-engaging have been examined and found *unfit* to re-engage, by the Regimental Surgeon, they are to be discharged at the head-quarters of their regiment, dispensing with the routine of sending the men to the district head-quarters, and only forwarding their discharge documents to the Commissioners of Chelsea through the usual channel.

The remarks of Dr. Crawford* on the subject of the Surgical Inspection of Soldiers on Re-engagement, are well worthy of perusal, and appear to me to exhaust this subject, and I strongly recommend them to the perusal of the junior Medical Officers of the service.

Such then are some of the principal points to be attended to in drawing up the detailed medical histories for invaliding. These documents are of great importance, and are intended to convey from the Regimental Medical Officers every detail regarding the diagnosis, prognosis, and progress of the case, which would assist the Staff Medical Officers in arriving at a final and decided opinion respecting the unfitness of the invalid.

It cannot be denied that these documents are often very carelessly prepared, and are sometimes more calculated to mislead than to direct. The form now adopted† is an admirable one, and if carefully filled up ought to afford all the necessary information.

In the case of foreign invalids, this detailed medical history is to be handed to the medical officer proceeding in charge of the invalids, in order that he may be acquainted with the cases under his care, and also continue on a space left for that purpose the history of the progress and treatment of each invalid up to his arrival at Netley.‡ In the case of home invalids, the de-

* Observations on the Examination and on the Physical Disabilities of Recruits, Army Medical Report for 1862.

† W. O. Form 891.

‡ Medical Regulations, p. 150.

tailed history is to be forwarded to the Principal Medical Officer of the District for his information.

In the instances of men who are brought forward for discharge on account of *mental diseases*, the history of their cases is to be detailed on a different form, viz., that at page 106 of the "Medical Regulations."

And in these cases of mental disorder perhaps more than in any other, it is incumbent upon the medical officers who have the management of them in their early stages, to adopt those measures of treatment which will give evidence to an Invaliding Board that every available means has been used to restore the soldier to the service, and will thus enable the Board to record an opinion that there is no likelihood of such invalids, if discharged, being re-enlisted.

The Medical Report.

This important portion of the documents of every military invalid will be found on the third page of the "Discharge Document."* It comprises a series of six questions, to which answers are required to be given by the examining Surgeon who in the first instance brings the soldier forward for discharge.

Also the opinion of the Inspecting Medical Officer, who, according to the Horse Guards' Order already quoted, is not to be under the rank of a Deputy Inspector-General of Hospitals.

It is from this report that the Commissioners of Chelsea form their opinion regarding the soldier's claim for pension. And it is consequently a document of the greatest importance, both to the invalid himself and to the public.

I proceed now to make some observations upon each question set forth in this Report.

1. "State the Name of the Disability, &c."

Opposite this question the Medical Officer is to enter the name only of the disease or injury for which the soldier is to be invalided. If he labours under more than one disease—for example, phthisis and hernia—the most prominent disease should be stated first, but the other ought on no account to be omitted.

1. Firstly. State whether the disability existed prior to re-enlistment, and the grounds upon which such opinion is formed.

This is a question which refers principally to young soldiers, and the object of it is to obtain from the Medical Officer, who has had most opportunity of observing the invalid, an opinion as to the existence of the disability prior to enlistment.

Each recruit on joining the service, or rather at the stage of his attestation before a magistrate, is obliged to declare—

That he never had been rejected as unfit for Her Majesty's service† on any previous enlistment.

If upon mature investigation, and careful observation of the case, the Medical Officer discovered, upon good grounds, that the invalid had previously suffered from fits, spitting of blood, or any of the diseases set forth in the attestation paper, it would to a great extent invalidate his claim to a pension; but as this is a matter difficult of verification, it behoves the Medical Officer to state very clearly the grounds upon which the opinion of the existence of such disability previous to enlistment is formed.

2. "*Secondly, whether the invalid, if discharged, can be repassed into the service.*" ‡

The grounds upon which an opinion may be formed regarding the impossibility of the invalid's re-enlisting, if discharged, have already been adverted to, but a short recapitulation may not be out of place.

1st. The existence of distinct and *easily detected* organic disease, or disabling wound or injury: as for example, well-marked phthisis, fracture with shortening of the limb, anchylosis of a joint, &c.

2nd. In doubtful cases, the existence of such marks of treatment in certain localities as are understood by Medical Officers to indicate that active treat-

* W. O. Form 83.

† Recruit's Attestation Paper.

‡ It is hardly possible to imagine that the nature of this question could be misunderstood. In the case of an invalid recently inspected at Netley, the answer given by the Medical Officer was as follows:—"It is not desirable that he should"!

ment had been employed for the cure of the disability without effect, and that in spite of such treatment the soldier was considered still unfit for service.

3rd. The general appearance of the invalid, exhibiting great muscular tenuity, or the evidences of well-marked scrofulous diathesis, would be sufficient to enable the Medical Officer to give a negative answer to this question.

4th. The existence of the marks of the letters D and B C, or distinct marks of corporal punishment.

Question No. 3.—"In ophthalmic or other disorders of the eyes, state how the disease was contracted, and whether the same was or was not prevalent at the time in the regiment or at the station."

In replying to this question it is necessary to be careful to note whether one or both eyes are affected.* The nature of the ophthalmic affection should be distinctly stated, and the probable cause also. It is to be borne in mind that no soldier is to be discharged for the total loss of one eye only, whether right or left, if he have no other disability.

The portion of this question which refers to the prevalence of disorders of the eyes in the regiment when the invalid contracted the disease, has reference principally to ophthalmia in an epidemic form; but as it is possible for other affections of the eyes, such as granular conjunctivæ, to prevail in a regiment without the existence of acute ophthalmia in an epidemic form, the examining Surgeon should ascertain from the sources at his command whether there are grounds for stating that such affections were prevalent.

If the injuries inflicted upon the eyesight of an invalid had originated from the effect of ophthalmia proper, during any prevalence of that disease, and that the Medical Officer certifies the same, it would afford additional ground to the Chelsea Commissioners for an increase of pension to the soldier.

Before the invention of the ophthalmoscope many men were invalided for obscure affections of the eyesight, the nature of which was unknown, and as frequently were sent back to their depôts for further observation, and in many instances were considered malingerers, owing to the impossibility, in the state of knowledge of ophthalmic disease a few years ago, of determining the exact nature of the affections under which such cases laboured.

In the admirable and exhaustive paper on "Invaliding from Eye Disease," by Dr. Philip Frank, in the "Army Medical Report for 1860," attention is drawn to the grounds upon which ophthalmia would have to be considered *endemic* in a regiment.

Assuming from the observations that the prevalence of granular conjunctivæ in a body of men may be regarded as indicating a contaminated state of the atmosphere in which they reside, Dr. Frank shows that "the obligation of the State towards a soldier affected with vesicular lids would be tantamount to those which would exist if the recognised condition of prevalence had existed."

He further states, "that it is known that great stress is laid by the Chelsea Commissioners, in the regulation of pensions for impaired vision, on the question whether ophthalmia was prevalent at the time in the corps. Differences of opinion may still obtain with regard to the importance of vesicular granulations, but no military surgeon will doubt that a granular state of the lids remaining after a decidedly inflammatory attack of ophthalmia is a potent source of relapse."

Again, in reference to the question of the interest of the soldier with regard to pension when invalided for ophthalmia or its consequences, Dr. Frank remarks, "The interest of the affected individual distinctly demands, that in case a patient is invalided for ophthalmia, the disease not being, in the usual acceptation of the term, prevalent in the regiment at the time, it should be stated whether the patient had suffered from an attack at any previous period, when the prevalence of the disease was recognised, and to what extent the con-

* No soldier shall be discharged for the loss of an eye only, whether it be the right or the left; but if a soldier shall have lost an eye or wound in action, or by the effects of service, and shall receive other wounds, or be otherwise so disabled as to render his discharge necessary, the loss of an eye shall be taken into consideration in fixing the pension at such a rate as his combined wounds or disabilities may entitle him to receive.—*Pension Warrant*, page 5.

junctivæ had recovered from that attack, as the amount of pension may be very materially influenced by an absence of information on these points."

This question of vesicular lids being a disposing cause of ophthalmia, is a disputed one; but at all events, in the interest of the invalid, *he* should have the benefit of the doubt; and if granular lids had been prevalent in the corps at the time, distinct information should be given on the subject, opposite to this question.

No. 4. "If the disability is the result of wounds or other injuries received in action, or in the discharge of some act of military duty, describe distinctly the wounds, &c., and by what weapon, &c., inflicted."

The determination of this question is a very important one as regards the award of pension to the invalid, and it is necessary that very distinct and clear information should be afforded.

The scale upon which *permanent* pensions are granted to men who are discharged on account of incapacity for further service, from wounds received in action, has been already quoted.*

If the wound has been received in action, the nature and character of the wound should be briefly stated, whether punctured, incised, or gunshot wound. If *not* in action, but in the discharge of some military duty, the nature of the duty, and the result of the finding of the Court of Inquiry, should be stated on the first page of the discharge document.

The circumstances which constitute an act of military duty, during the performance of which the disability may have been caused, includes injuries produced irrespective of wounds received in action, such as the explosion of gunpowder, the bursting of guns, falls from horses, the upsetting of guns, carriages, &c. Injuries from such causes may have been received during the ordinary duties of drill, or on field days in times of peace, but are nevertheless acts of military duty, and as such entitle the invalid to whatever benefit arises from the fact.†

The point to be decided, in order to answer this portion of the question satisfactorily, is, was the soldier on duty at the time he received the injury? or was the injury in any way the result of his own carelessness?

These questions are virtually settled by the Court of Inquiry, which should assemble to decide this matter as soon after the receipt of the injury as possible, but the Medical Officer should also state his opinion upon the point in reply to this question.

The provisions of the Pensioning Warrant give a margin to the Chelsea Commissioners in granting pensions to men whose injuries are not distinctly stated to have been caused *in* and *by* the service.‡

No. 5. "If the injury occurred *in* but not *by* the service, state how it occurred."

When the injury has not been received during the discharge of any military duty, but as an accident while the soldier was off duty, it may be said then to have occurred *in* but not *by* the service; and the exact circumstances connected with its occurrence should be stated here.

No. 6. "And whatever may have caused the disability, &c., describe the present state thereof, and the probable effect in future on the invalid's capability of contributing towards earning a livelihood, adding how far it is con-

* See Pension Warrant, par. 7.

† It is to be regretted that in framing these questions reference was not more distinctly made to *diseases* the result of climate, exposure in the field, and other causes incidental to military service. They point principally to physical injuries; and sufficient opportunity is not given to the Medical Officer to state his opinion with regard to disabilities which, although not the result of direct injury, may have been equally produced *in* and *by* the service.

‡ "The pecuniary benefits attaching to cases of disability are as a rule to be limited to disability caused *in* and *by* the service; but in cases of soldiers whose service and good conduct, combined with the information obtained at their personal examination by the proper authorities, may appear to give them a claim to some consideration, gratuities or pensions for short periods may be granted by the Commissioners of Chelsea Hospital, although the disability rendering them unfit to remain in the Army may not be stated in the discharge documents directly to have been contracted *in* and *by* the service.—*Pension Warrant*, par. 4.

sidered to have been caused or aggravated by the use of intoxicating liquors or indulgences in other habits or vices."

In filling up this portion of the report, the examining Surgeon is to distinguish between disabilities of a *temporary* and those of a *permanent* character. From the nature and previous history of the disability he is to judge of the hope that may exist as to its curability, and as to the invalid's capability of contributing towards his maintenance. It should be stated whether he is *totally* incapable, or only partially so. By the provisions of the Pension Warrant, the Commissioners of Chelsea have the power to grant permanent or conditional pensions * to men who have been found unfit, from disabilities contracted *in* and *by* the service, according to a certain scale regulated by the soldier's service, the climate where he may have served, the degree of disability, and his previous conduct. Temporary pensions may also be renewed from time to time, and even be made permanent, by the Secretary of State for War, at the recommendation of the Commissioners of Chelsea.

But the Commissioners are guided in the first instance, in the award of temporary or permanent pensions, by the replies of the examining Surgeon to this and the other questions in the report, and by the opinion of the Principal Medical Officer.

The opinion regarding the habits of the invalid having caused his disability, must, as a rule, be based on facts capable of proof by reference to the Defaulter's Sheet, and to the Soldier's Medical History Sheet. At the same time there are often cases in which the examining Surgeon would be justified, from his own knowledge, in stating his belief that the disability *was* aggravated by vice and intemperance, although there may be but few records of a criminating character in these respects forthcoming.†

This concludes the remarks upon the preparation of the Medical Report. It is from this Report, *and the other available medical records*, coupled with his own personal observation and examination of the invalid, that the Principal Medical Officer is enabled to state his opinion regarding the fitness or unfitness of the invalid for service; and it is from the whole Medical Report on the third page of the Discharge Document, comprising the answers of the examining Surgeon and the opinion of the Principal Medical Officer, that the Commissioners of Chelsea Hospital form their opinion respecting the claim of the invalid to pension.

It is therefore very necessary that these replies should be carefully drawn up, as, by neglecting to give full information upon all these points, "loss may be entailed upon the soldier upon the one hand, or an imposition may be inflicted on the public on the other."‡

"The Medical Officer should also send with the man his Medical Histories Sheet, taken from the Medical History Book." §

The Medical Histories Sheet, embodying as it does the whole previous medical history of the invalid, unless he should have enlisted previous to the year 1859, and if not, his history since that year (when these documents were first brought into use), enables Staff Medical Officers to see at a glance the diseases from which the invalid may have suffered during his service, and thus assist them in forming an opinion regarding his likelihood to continue the active duties of a soldier.

The value of the Medical Histories Sheet as an invaliding document is very great; and it is only when a soldier's medical history culminates in being invalided, that the importance of keeping a careful record of his previous history is fully manifested. In the preparation of cases for invaliding by the Medical Officers of divisions of invaliding hospitals, the Medical Histories Sheet affords the most valuable information; and by giving a bird's-eye view of the invalid's history, in its moral and medical aspects, from the time of his

* Pension Warrant, par. 11.

† In the case of an invalid recently discharged from Netley, the Regimental Board stated that the man's habits were temperate; but the commanding officer appended a memorandum to the proceedings declining to confirm this portion of them, on the ground that the regimental surgeon had stated in his report that the man's disability "had been aggravated by the use of intoxicating liquors."

‡ Horse Guards Order, April 1, 1863.

§ Medical Regulations, p. 105.

enlistment to the period of his last admission to hospital, it places the invaliding Medical Officer in the possession of a series of facts which give weight and certainty to the opinion he may form from personal examination.

When the discharge of any soldier is completed, this document is to be forwarded to the Director-General.*

Such then are the documents necessary to be prepared by the regimental Surgeon previous to sending an invalid to the head-quarters of the district, to be disposed of by the Principal Medical Officer and the General Officer, after such observation as may be necessary. After this observation the invalid is brought before a Board of Medical Officers for final decision, the President of which is not to be under the rank of a Deputy Inspector-General, who, if he coincides with the Surgeon as to his unfitness, fills up the certificate on the third page of the Discharge Document. (Special reference to this certificate will be made further on.) An application then is made by the General Commanding the district to the Commander-in-Chief for authority to discharge the invalid, upon receipt of which his discharge documents will be forwarded, through the Adjutant-General or Deputy Adjutant-General in Dublin, to the Commissioners of Chelsea or Kilmainham, for the settlement of his claims to pension. If the case be a doubtful one, which appears after observation to require further investigation and treatment, the invalid is to be sent either to Netley or Kilmainham for treatment and decision at these establishments.

This brings the remarks on the procedure of invaliding on *home service* to a close.

The details of the process regarding the foreign portion of the Army differ in few respects.

Soldiers serving abroad may be sent home either for change of climate or for the purpose of being discharged from the service.

The preliminary arrangements, with regard to observation and treatment in the regimental hospitals, are similar to those adopted on home service.

At certain periods of the year, according to the nature of the climate, the invalids from regiments serving in each district of the Command are collected; and after examination and decision upon their cases by a Medical Board, are forwarded to the nearest port for embarkation to England.

In matters of detail the arrangements for the transmission of invalids differ in different foreign stations.

Invalids from whatever stations of the Army, and from all branches of the service serving abroad, are now received into the Royal Victoria Hospital, Netley. On their arrival they are inspected, and according to the nature of each case are apportioned to one of the three great divisions of the establishment—the Medical, Surgical, or Convalescent Divisions.

In the latter division of the hospital are now received those invalids who,

(Circular.)

Sir, Army Medical Department, 30th April, 1863.

With reference to the Circular dated Horse Guards, the 4th instant, I have the honour to call your attention to the following arrangements which this alteration in the mode of invaliding renders necessary. You will be pleased to transmit weekly to this office a return on the enclosed form, including only the cases of such men as may be sent to the head-quarters of the district to be disposed of as invalids; and you will give directions to the Medical Officers in whose hospitals these men may (for convenience) be treated, that such cases are not to be included in their returns.

The medical history sheets of these men should be forwarded to you; and in the event of their non-arrival you will call upon the Medical Officer to transmit them to you without delay. The sheets of such men as are finally discharged the service should accompany the weekly return in which their names appear as discharged, the requisite details as to the date and cause of discharge being inserted in them; those of men who are returned to their corps should be transmitted to the surgeon in charge; while those of any men who may be sent to Netley or Kilmainham for further treatment, must be forwarded to the Principal Medical Officers of hospitals. The disposal of such men as may die, and those who are discharged the service as invalids, must be notified by you to the Surgeon of the corps or depôt to which the men belonged by means of medical certificate.

(Signed) J. B. Gibson, Director-General.

under the old system of invaliding, would have been sent to the barracks of an invalid depôt, but who now, under the restrictions of hospital discipline, are prevented from indulging in the dissipation which was found so prevalent in St. Mary's Barracks, Chatham.

Time-expired men and soldiers whose disabilities do not require medical treatment, or who have recovered during the voyage home, and have become again fit for duty, are admitted to the Convalescent Division of Netley, while those requiring treatment are admitted to the Medical or Surgical Divisions.

The procedure of invaliding after admission to Netley consists of—

1st. Observation and treatment by Divisional Staff Surgeons.

2nd. Examination and decision of a Medical Board, the President of which, if possible, is not to be under the rank of a Deputy Inspector-General of Hospitals.

3rd. Examination by the Governor of Netley Hospital.

4th. Confirmation of discharge by the Field-Marshal Commanding-in-Chief.

5th. Final settlement of claims to pension by the Commissioners of Chelsea.

The nature of the observation and treatment through which an invalid passes in the wards of Netley Hospital, previous to his being brought forward before the Invaliding Board for discharge as fit or unfit, is as follows:

The records of the previous medical history of the invalid are all recorded in the Divisional Admission and Discharge Book. The daily progress of the case, either towards cure or unfitness, are entered in the Case Books of the wards.

The Staff Surgeons in charge of divisions subject the invalid to frequent examinations, and the Principal Medical Officer of Netley has also frequent opportunities of witnessing the condition and progress of each individual case. This course of observation and treatment is often extended, in doubtful cases, over a considerable period of time; and every reasonable opportunity is given of trying the effect of treatment in restoring the invalid to efficiency.

In this way many men who are sent from foreign stations in a state of health rendering them apparently quite unfit for further service, recover, under the combined influence of a sea voyage and a course of treatment at Netley, and are again restored to the service.

As soon as the Divisional Staff Surgeons have decided upon the unfitness of any invalid in the wards of Netley, he is brought before the Invaliding Board.

Owing to the large number of invalids passing through Netley during the summer, which would entail the assembling of these Boards daily, and to the impossibility of keeping Staff Surgeons and other Medical Officers constantly employed in this duty, the formality of a Board is dispensed with, and this duty is performed by the Principal Medical Officer of Netley, assisted by a Staff Surgeon from either of the divisions, whose duty it is to bring before the Principal Medical Officer all the previous information regarding the invalids which can be obtained from documents forwarded from the stations from whence the invalids came, from the records of their cases since their admission to Netley, and from personal examination.

Guided by these opinions, as well as by his own examination, and verification of the opinion of the officers through whose hands the invalid has passed, the Principal Medical Officer decides upon the unfitness of the man, and makes the following declaration to that effect, upon the third page of his Discharge Document:—

Opinion of Inspecting Medical Officer.

"I hereby certify that I have carefully read the whole of the medical records of the case, No. —, — Regiment, and have made a most minute personal examination of the man himself, in which I have verified the answers of ——— [Surgeon or Assistant-Surgeon, as the case may be], to the above question; and I am of opinion that the disability of No. —, — Regiment, permanently incapacitates him from the active duties of a soldier, and that he cannot re-enlist if discharged.

"[Signature of Principal Medical Officer.]"

A glance at this certificate will show that the final decision regarding the unfitness of an invalid rests with the Principal Medical Officer of the hospital

or district. The responsibility of this decision is no light one, and it was a wise policy which vested this duty in the hands of officers of matured experience, familiar with the habits and diseases of soldiers. The latter portion of the certificate is the part which more frequently than any other gives rise to doubt and hesitation on the part of the Principal Medical Officer; and no effort should be wanting, on the part of the Medical Officer through whose hands the invalid may have passed previous to his final examination, to render the conscientious signing of this certificate a matter of ease.

This certificate having been signed, and the Principal Medical Officer's opinion regarding the invalid's unfitness for service having been recorded upon it, the discharge of the soldier may be said to be virtually completed.

The remaining certificates are formalities confirmatory of the Medical Report, which forms a most important part of an invalid's Discharge Document.

The invalid having passed through this ordeal, is next brought before the Governor of Netley Hospital, who states his opinion as follows:—

"I am of opinion that, for the medical reasons above assigned, and after personal inspection, the man in question is no longer fit to perform the duties of a soldier."

The discharge documents are then forwarded, through the Adjutant-General, to the Commander-in-Chief for confirmation, and finally to the Commissioners of Chelsea for settlement of claim to pension.

Pending the decision of the Chelsea Board—that is to say between the period of the invalid being found unfit for further service by the Principal Medical Officer and the arrival of the authority for discharge, an interval of about three weeks—should he become so ill as not to be able to leave the hospital, his discharge must be *cancelled*; consequently it is incumbent upon Staff Surgeons in charge of divisions of an invaliding hospital, in the first instance, to be careful not to bring forward men for discharge who may not be likely to be able to leave the hospital when the authority for their discharges arrives.

Many men, especially those suffering from phthisis, are anxious to go home to see their friends before they die, and it is difficult to refuse such requests; but unless there is reasonable ground to believe that the invalid will be able to proceed to his home, it is not desirable to bring him forward for discharge.

*The Invaliding of Insane Soldiers.**

The special instructions regarding the invaliding of soldiers for insanity are contained in the Medical Regulations, page 52, paragraph X, and also at page 106.

The procedure of invaliding at present in operation is as follows:—

1st. Observation and treatment by Medical Officers of the corps for a period not less than one month.

2nd. Transfer of the soldier, if on home service, to the lunatic asylum at Fort Pitt, or to the lunatic wards at Kilmainham, and if on foreign service, in the first instance to Netley, and thence to Fort Pitt.

After treatment has been carried into effect by the Regimental Medical Officers, extending over the period above referred to, and when such treatment has failed to restore the soldier to soundness of mind, a statement of his case is forwarded to the Director-General of the Army Medical Department, and his approval obtained for the removal of the man to the lunatic wards of a general hospital.

The detailed history for invaliding in cases of this kind is prepared according to the form at page 106 of the Medical Regulations, and it is of great importance that distinct and clear information should be given in reply to the seventeen questions embraced in this document.

The establishments for the treatment and invaliding of lunatics after their transfer from their regiments, are the lunatic asylum at Fort Pitt, and the temporary lunatic wards at Kilmainham and Netley.

* For the information under this head I am indebted to my friend Dr. Balfour Cockburn, Royal Engineers, in medical charge of the Lunatic Asylum at Fort Pitt, Chatham.

The lunatic asylum at Fort Pitt is, so to speak, a detachment of Netley, and all cases of insane soldiers arriving from foreign stations, as well as those which occur in England, are transferred to this branch of the invaliding establishment of the army.

All cases under treatment at Fort Pitt Lunatic Hospital are borne on the strength of the Netley establishment, there being no suitable building at Netley for the accommodation of insane patients.

After reasonable time has elapsed for observation of the invalid at Fort Pitt, he is finally disposed of in either of the following ways :—

1. By discharge from the service.
2. By transfer to the Bow Lunatic Asylum.
3. By transfer to his regiment or depôt for duty.

If the invalid is found unfit for further service, but fit to be set at liberty with his friends, the Medical Officer in charge of the asylum at Fort Pitt brings him forward for discharge in the usual way already described, and his discharge document, together with a certificate according to the form noted below,* are forwarded to the Commandant at Netley, by whom the necessary steps are taken to procure his final discharge.

Every lunatic soldier thus discharged is attended to his home by a guide, who is furnished with printed instructions for his guidance in case of difficulty.

If the invalid is considered to be *unfit* thus to be set at liberty, the certificate of the Medical Officer in charge of the lunatic asylum at Fort Pitt is modified accordingly. Application is then made to the man's friends, to ascertain if they are willing to take charge of him. If the answer be in the affirmative, his discharge is then completed, and he is sent under escort to his home. If in the negative, special application is made to the Director-General of the Army Medical Department, in order to obtain the sanction of the Secretary of State for War for the man's removal to the Lunatic Asylum at Bow.

In the cases of men considered quite unfit to be at large, even with their friends, the procedure is somewhat different.

A statement of the nearest of kin having been obtained from the Commandant at Netley, the invalid's case is prepared by the Medical Officer in charge of the Fort Pitt Asylum. The usual certificates, as required by Act of Parliament, are prepared and signed by two Medical Officers, who also sign the proceedings of a Medical Board assembled to investigate the mental condition of the invalid.

These documents are then transmitted to the War Office, whence the necessary authority for the transfer of the insane soldier to the Bow Lunatic Asylum emanates.

The military lunatics at this establishment are inspected periodically by a Military Medical Officer of high rank, and when a soldier has been an inmate of the asylum for twelve months without recovery, his discharge documents are completed, and he is struck off the strength of his corps.

SHERMAN'S MARCH.

A Sketch illustrative of Field Service.†

By Inspector-General W. M. Muir, C.B.

General Sherman started on his great march through Georgia and the Carolinas with four army corps, viz., the 14th, 15th, 17th, and 20th, of an

* *Lunatic Hospital, Fort Pitt, Chatham.*

The man named in the margin may in my opinion be safely set at liberty upon discharge from the service.

He wishes to reside at

† This sketch does not form a part of Dr. Muir's official report of his visit to the camps of the United States Army, now in course of preparation by him; but it is of interest to military surgeons, and is therefore published here with the writer's permission.

aggregate strength of 60,000 infantry, and a division of cavalry 5,500, and artillery reduced to the minimum of one gun per 1,000 men.

Before starting from Gaylesville and Rome, the sick and wounded, the non-combatants, the machinery, extra baggage and tents, waggons, artillery ammunition, stores, everything and person not needed in the future campaign, were sent back to Chattanooga. The men had had two months rest in Atlanta, were in high health, and amply supplied, no fewer than 200 locomotives being employed in feeding this army; and the recent destruction by fire of the magazines at Nashville and Atlanta proves the extent of the reserves, the stores destroyed being valued at the enormous sum of half a million of dollars.

On quitting Atlanta on the 15th November, 1864, the army stood detached and cut off from all communication from the rear, and had to trust to the resources of the country for its supplies; but doubtless the General rightly judged that at every plantation (subsisting a large number of slaves) he would find depôts of provisions, it being the custom in the South to lay these up in store once a-year, while the published register of each State would enable him to form a pretty accurate idea of the number of horses, waggons, &c., to be obtained *en route*, due allowance being made for the repeated drains of these by the Confederate army.

The army quitted Atlanta with twenty days provisions, in waggons and on the hoof, while each man carried in addition three days rations in his knapsack.

The breadth of country covered by the four columns on the line of march may be roughly estimated at forty miles. The order of march varied according to the nature of the country and the opposition encountered. If a stream crossed the path, a strong party of mounted infantry or cavalry, sent forward the day before, probably found the bridges burnt, and the pontoons were then pushed to the front. If a fight was anticipated, the trains were shifted to the rear of the centre. Under any circumstances, the division having the lead moved unencumbered by waggons, and in close fighting order.

The ambulances following in the rear of the division were always in such close proximity as to be available if needed.

In the van of each regiment followed the pack mules, laden with every kind of camp baggage, including blankets, cooking utensils, the led horses, and contrabands.

At the head of the column, flankings were spread out in a line parallel to the leading troops for several hundred yards, according as the occasion required. On either flank of the army, and changing from one to the other as circumstances demanded, was the cavalry division, the trains of which fell in with those of the infantry.

In the Georgian campaign—that is from Atlanta to Savannah—the longest march done in one day was 27 miles; the average 10¾. Total distance from Atlanta to Savannah, 300 miles. For the first three days, marching was kept up at the rate of 12 miles a-day; but when no enemy was found to oppose the progress of the army, the rate was reduced to 10 miles.

In the Carolina campaign, the longest march done was 22 miles; the average rate of marching also 10 miles.

Distance from Pocotaligo to Goldsboro', 475 miles; from Goldsboro' to Raleigh, 58; from Raleigh to Alexandria, by Petersburg and Richmond, 300 miles. Accomplished in 19 days.

The army left Atlanta 15th of November, and reached Savannah 21st of December; left Savannah 18th January, and reached Goldsboro' 24th March; left Goldsboro' 10th April, and reached Raleigh 14th April; left Raleigh 1st of May, and reached Alexandria on the 23rd of May.

In the Army of Tennessee (15th and 17th Corps, General Howard commanding, aggregate strength 33,000) the following was the allowance of ambulances, army waggons, &c., to a division:—Ambulances, 32; army waggons, 4; hospital tents, 10. Every two regiments had, in addition, a waggon for surgeons' private property, mess things, &c.

Total Medical Officers of the Army of Tennessee, 250, *i.e.*, one to every 1,300 men. The only medicine chests carried were the panniers, or in lieu thereof the field companions. The ambulance system was that of the Army of the Potomac, but on a reduced scale. The field medical arrangements were as in that Army, *i.e.*, on the divisional basis.

The relative *personnel* and *materiel* in the Army of Georgia (14th and 20th Corps, General Sloane commanding, aggregate strength 30,000) may be set down at nearly the same ratio.

The field kit carried by the soldiers consisted of the following articles:—A flannel shirt, a pair of flannel drawers, and two pairs of woollen socks in knapsack. Also half a shelter tent per man, one India-rubber blanket, and one field blanket, with generally three days' rations in haversack.

All carried 40 rounds of ammunition in their pouches, and many 100 rounds, the difference being disposed of about their person, or carried in their knapsack.

If to the weight of arms and accoutrements, &c., thus carried, be added the loot, onions, and sweet potatoes, which many of the men contrived to stow away in their pockets or knapsacks, a hundredweight is not an over-estimate of what some of the older and hardier campaigners managed to drag along.

The campaign in Georgia was little else than a military promenade or picnic, the weather and roads being good, few rivers to cross (the line of march lying parallel to them), supplies everywhere abundant, and, with the exception of the insignificant actions at Gordonsville and Milledgville, at the crossing of the O'Connor River, and at Fort M'Alister (involving a total loss of 150 killed and wounded), the work was light and the opposition trifling. In addition to the skirmishing above alluded to, the chief duty of the men consisted in pulling up railway track, and occasionally "corduroying."

The roads lay for the most part through splendid pine forests, where two trains of waggons, or troops in double column, could march abreast.

The health of the army in this campaign was, as might be expected, excellent, some regiments not having a sick man, and the average sick to strength 2 per cent.

Measles, and a few cases of pneumonia and small-pox, constituted the only sickness met with.

The conditions under which the Carolina campaign was prosecuted were in several respects very different. From the very first start from Savannah, and all the way to Goldsboro', rain was frequent, often coming down in torrents; the rivers rose suddenly, so that in many parts the roads and adjoining country were 15 feet deep in water, where a few days before waggons and trains were rolling along in comfort. Swamps, deep mud, and floods, were in short the order of the day. The Salkahaldir, Edisto, Cargoree, Saluda, Brond, Catawba, Water, Santerer, Pedie, Capefear, Neuse Rivers, to say nothing of smaller streams, had to be bridged over, and no less than 400 miles of road and swamp "corduroyed," in consequence of which the men were often waist and even throat deep in water. To add to their troubles, an energetic enemy was ever on their flanks, opposing their advance at every available position. Notwithstanding these difficulties and hardships, the army retained its health, not showing a larger sick list than 4 per cent.; bronchitis, pneumonia, and measles being the principal diseases.

On leaving Savannah, precautions were taken to send away all the sick and wounded and feeble men, and the baggage and impedimenta were reduced to a minimum, the "flag" only being allowed to officers instead of the wall tent. The men were reclothed, and 30 days' provisions placed in the waggons.

Throughout this and the Georgian campaign, the supplies (obtained by foraging, with a few days' exception) were abundant, consisting of chickens, turkeys, geese, ducks, pigs, hogs, sheep, calves, beeves, hams, basketsful of honey, pots of fresh white lard, and a large supply of syrup made from sorghum, found at every plantation. The granaries were filled with corn and wheat (cereals having recently largely taken the place of the cotton crop), vegetables were found in unlimited quantities, and flour-mills were not wanting when required. As the waggons passed along they were not allowed to stop, but the grain and fodder stuffed into them, in front and rear, as they passed. Horses and mules were also found in such quantities that the army is believed to have been refurnished with these animals three times over.

No preserved meat was carried, except a small supply of "beef stock" for the use of the sick. Foraging was carried out theoretically in a systematic manner, an officer and ten men per company being detailed for that duty; but practically a great deal of this was done by "runners," or licensed marauders,

who traded on their own account, and formed a sort of advanced guard or reconnaissance party of the army.

During both campaigns, water was found everywhere, and of excellent quality, the country traversed being intersected in all directions by rivers and brooks.

With respect to clothing, the men had *en route* nothing extra beyond what has been stated, except that a few carried an extra pair of boots. On their arrival at Savannah they were "very ragged;" and when the army reached Goldsboro' many were marching without shoes, bare-headed, and with their clothes in "tatters." At both of these places they were reclothed. In the latter instance supplies of clothing and other articles were brought by transport from Wilmington, the army being by the same means relieved of its sick and wounded, and hosts of slaves who had joined it on its march.

As the army advanced towards Washington, those supply depôts became more and more frequent.

Such is a sketch of this famous march, that will henceforth take its place among some of the most celebrated in ancient or modern times, not only on account of its intrinsic merits, but the vast results it brought about.

RESECTION OF THE ELBOW AND SHOULDER JOINTS.

FURTHER REMARKS upon Cases of Invalids admitted into the Royal Victoria Hospital from New Zealand, during the year 1865, on account of Gunshot Injuries of Joints, for which Resection was performed in the Field Hospitals.

By Deputy Inspector-General T. LONGMORE, *Professor of Military Surgery at the Army Medical School.*

IN the fifth volume of the Army Medical Reports I made some remarks upon the cases of six invalids from New Zealand, who had undergone the operation of resection of the shoulder-joint on account of gunshot injuries. Since the date of that report three other invalids have been admitted from the same station into the Royal Victoria Hospital, in whom this operation had been performed for gunshot injuries. In two of these cases the resection was made in the shoulder; in the third the operation was performed in the elbow-joint. As these cases serve to illustrate several points of practice noticed in my previous remarks on the subject, and contain also some additional features of interest, I have thought it worth while to transmit their histories. Careful clinical observation of the results of such cases, according as they may have chanced to differ either in the precise situation or complications of the original injury, or in details of the mode of performing the resection, or in the extent to which the operation has been carried, appear to be the best and indeed the only safe means of arriving at rules for general guidance as to the treatment to be adopted on similar injuries being brought under the care of military surgeons; but in order that this practical information may be fully attained, it is obviously necessary that the circumstances under which the wound was received, the state of the injured structures when first brought to the notice of the surgeon, the treatment, and all important changes during the progress of the case, as well as its final result, should be fully and accurately noted. It unfortunately happens that such accurate histories are very seldom obtained with the invalids who are sent to Netley.* This appears to be chiefly due to

* For illustration of the errors and omissions, even in the *definitions* of particular wounds, which creep into the histories transmitted with invalids, the following examples may be quoted from those which were sent with the wounded invalids from New Zealand during the year 1865:—In one case of gunshot fracture of the right thigh, the thigh injured was stated in the medical documents to be the left thigh. In five instances of gunshot wounds of extremities, the side to which the wounded extremities belonged is not stated. In a fracture of one bone of the forearm, the bone fractured is not named.

the nature and exigencies of military service. The patient usually becomes an inmate of several hospitals before he reaches the general hospital at the port of embarkation. It probably happens that the history of the case which is sent with the patient to England is drawn up at this last-named hospital by some surgeon or assistant-surgeon who is practically unacquainted with much that has happened to the man previously to his arrival, and who draws up his account from brief remarks sent with the patient from an intermediate hospital, aided by his own hurried observation. Added to these circumstances, it constantly happens that during the periods for which a patient remains at any one hospital, the general arrangements of the service necessitate change of medical attendants, and thus arises another source of mistakes and omissions. A complete and reliable history in each case could only be ensured by the regular transmission of accurate notes from each surgeon to his successor, to whom the charge of the patient is transferred; and many difficulties arise on active service in the way of such careful records being obtained.

The earlier histories of the following cases have been collected from all the ordinary sources of information available, as well as from private notes concerning them sent to me from New Zealand. By patient inquiry a great deal of information concerning the circumstances of their wounds may always be elicited from the men themselves; for they have no purpose of suppressing or modifying the truth, although, as happens in most cases with soldiers, from want of thought or want of accuracy in expression, a good deal of time and careful sifting are usually necessary to obtain the exact truth in each case. Staff Assistant-Surgeon D. Gillespie has assisted me in taking the histories of the following cases.

As the two resections of the shoulder-joint were performed almost exactly in the same manner as in the six instances described in my former remarks, and as the subject of this operation was very fully considered in them, I need refer but very briefly to it again. The second case of resection of the shoulder, viz., that of Private G. Box, illustrates several points of especial interest. It was altogether perhaps the most successful case of excision of the shoulder which has arrived from New Zealand. It also afforded the opportunity of studying the effects of the preservation of the long tendon of the biceps muscle up to the time which had elapsed when the patient left Netley, for this tendon could then still be plainly felt in its original integrity. The apparent influence of this preservation will be found in the remarks attached to the case.

The case of resection of the elbow-joint has been remarked upon at more length, as this is the first instance of the operation which has arrived from New Zealand.

The reports of the two cases of resection of the shoulder-joint are first given.

Case No. 1.—Report of the Case of No. 612, Private J. Bryant, 43rd Regiment, aged 26 years, of 6 years' service, who was admitted on the 21st of January, 1865, at the Royal Victoria Hospital, labouring under the effects of Resection of the Head of the right Humerus after a Gunshot Wound.

This soldier was wounded on the afternoon of the 29th of April, 1864. He was kneeling down in a Maori rifle-pit, about five feet deep, and was in the act of capping his rifle, when he was struck by a bullet discharged from the double-barrelled gun of a Maori who was standing at a distance of four yards above and in front of him. The ball, apparently a round one, entered Private Bryant's right shoulder anteriorly, at a spot one inch below the acromion process, passed backwards and downwards through the joint, and escaped posteriorly at a spot two inches below the acromion process, and two inches and three-quarters distant from the point of entrance. At the moment of being struck, the patient felt a hot scalding sensation like a sudden flash of fire along his arm. He did not himself fall after the receipt of the injury, but his arm fell at once powerless by his side; and on trying to raise it with the hand of the other arm for the purpose of supporting his rifle, which he wished to fire off, he found himself unable to do so. A few minutes afterwards he managed to scramble out of the pit and through the bush, so as to get farther away from the enemy's pah. There was considerable bleeding from both

wounds, according to the man's statement. He remained about six hours lying on the ground near the pah, and was then brought to camp, where some wet lint and a bandage were applied, and the bleeding stopped. The following morning he was sent by steamer to hospital at Auckland, a distance of 100 miles. During the journey, which lasted two days and one night, he suffered very great pain, and the hæmorrhage returned in a slight degree. After arriving at Auckland it was ascertained that the head of the humerus had been extensively splintered, and it was resolved to excise it. This operation was performed on the 20th of May, 1864, by Surgeon W. A. Mackinnon, C.B., 57th Regiment, the patient being under the influence of chloroform. The incision, which was five inches in length, was made from the acromion process downwards, along the outer edge of the biceps muscle, and so directed as to pass through the centre of the wound of entrance. The wounds took on a healthy action after the operation, and the patient progressed favourably in all respects. The discharge was copious, particularly from the wound of entrance. Both wounds were closed four months after the resection, the wound of exit being the last to become healed. No abscesses formed down the arm, nor had any fresh openings to be made for the evacuation of pus; no sequestra had to be removed, nor did any dead bone escape by either of the wounds subsequently to the operation of excision. On making passive motion after the closure of the wounds, the wound of exit broke out afresh, and continued to discharge for a month. It finally closed on the voyage home, and has not again become open. On examination of the injured limb at the time of the man's arrival at Netley, both wounds were found to be perfectly healed. The cicatrix of the wound of entrance was depressed and puckered, circular in shape, and one inch in circumference. It was rather larger than the wound of exit, which was more oval in shape, and less puckered and contracted. The wound of entrance was apparently directly connected by cicatricial tissue with the ligamentous substance formed between the scapula and the extremity of the humerus. The long head of the biceps was absent: it had been destroyed by the direct impact of the bullet at the time the wound was received.* A small portion of the tip of the acromion process also appeared to be wanting. The coracoid process had become very prominent: it was seen projecting beneath the clavicle, and considerably enlarged. The patient complained of pain on pressure being made upon this process. Scarcely any voluntary power of motion of the arm at the shoulder-joint itself had been recovered at the time the man left the Victoria Hospital. Passive motion, he complained, gave him pain in this region, of a sharp tingling character, which extended all round the new articulation as far as its scapular aspect. This pain was probably caused by the extremity of the humerus pressing upon the circumflex nerve; there was no evidence of the end of the bone pressing upon the axillary plexus. The patient had, however, full power of supinating and pronating the forearm without assistance: he could also extend the forearm at the elbow from the upper arm to an angle of 135°. All the larger branches of the brachial plexus of nerves appeared free from any impairment of their function. No evidence remained to indicate that the shock, and loss of power, described by the patient to have occurred at the time of the receipt of the wound, had been connected with any injury to nerves. Sensation was found to be everywhere perfect, and the patient could not remember having lost it at any time, wholly or partially, in any part of the arm.

The muscles of the injured arm were considerably atrophied around the injured shoulder. Below the acromion process a marked flattening was observable, instead of the natural roundness of this part of the limb. There was very great loss of substance in the deltoid muscle. The muscles of the forearm and hand were well developed.

The following measurements were taken in the humeral region while the patient was at Netley:—From acromion process to olecranon process of ulna: injured arm, 13¼ inches; sound arm, 14⅛ inches. Circumference immediately below axillary fold: injured arm, 8⅞ inches; sound arm, 9⅛ inches. From centre of sternum to anterior edge of acromion process: injured arm, 8 inches;

* See description of the Museum preparation of the injured structures at the end of the report of the case.

sound arm, 8½ inches. From point of coracoid process to posterior margin of scapula, immediately below the spine, the measure being made on a level plane: injured side, 8½ inches; sound arm, 12 inches.

Private Bryant was invalided from Netley on the 28th of February, 1865, his intended residence being Bury St. Edmunds, Suffolk.

Description of the Head of a Right Humerus, removed by Resection from Private J. Bryant, 43rd Regiment, by Surgeon Mackinnon, C.B., and presented by him to the Museum of the Army Medical Department at Netley.

The preparation consists of the greater part of the head of a right humerus, together with the great and less tubercles, and a small portion of the long tendon of the biceps muscle.

The force of the projectile has evidently been expended upon the greater tubercle, and its immediate vicinity. The greater tubercle itself is much broken, the greater part of its substance being driven towards the smaller tubercle.

A wide fissure commences at this seat of fracture and descends from it towards the shaft. The line of the saw has passed through this fissure, but the separation at the line of resection is very slight, and not easily perceived.

The smaller tubercle has been fractured, not by the direct stroke of the projectile, but by a portion of the broken greater tubercle, being driven and forced against it. It is in a great measure detached, and a considerable part of it has been forced upward towards the cavity of the joint.

A very narrow fissure extends from the seat of fracture, for about half-an-inch across the cartilage covering the articulating surface of the head of the bone; the rest of this surface is entire.

The long tendon of the biceps muscle has been divided just as it passed over the neck of the bone. The division appears to have been part of the original injury inflicted by the bullet. The edge of the small remaining portion of the tendon is irregularly torn, and does not exhibit a cleanly cut surface such as it would probably present if it had been divided by a knife.

Case No. 2.—Report of the Case of No. 159, Private G. Box, 50th Regiment, aged 28 years, of 8 years service, who was admitted on the 6th of December, 1865, at the Royal Victoria Hospital, labouring under the effects of Resection of the Head of the left Humerus after a gunshot wound.

This soldier was wounded in the left shoulder, at Nukumaru, on the 25th of January, 1865, underwent the operation of resection of the head of the humerus in the field hospital marquee the next day, and was admitted into the General Hospital at Wanganui, on the third day afterwards. The following abstract of the case was sent with the patient to Wanganui.

"Private G. Box, in the action with the enemy on the 25th of January, 1865, at Nukumaru, was wounded by a musket bullet, which entered the upper part of the left arm at the posterior margin of the deltoid muscle, passed upwards, and lodged in the head of the humerus just below the anatomical neck. On the 26th of January the wound was thoroughly exposed while the patient was under chloroform. At a consultation of Medical Officers, it was decided that resection of the head of the humerus was necessary. The operation was accordingly done 19 hours after the receipt of the injury. The operation was borne well by the patient. A good many muscular twiggs bled freely, but the bleeding ceased spontaneously; no arteries required ligature. The head and about half an inch of the bone were first removed. The bullet was found impacted in the situation before named. The head was fractured completely in to the joint. A second resection of about half-an-inch of the bone was made, through bone which was completely sound and unfissured. The operation was performed by one straight incision. The tendon of the biceps was preserved.

"A. D. Home, Staff-Surgeon."

The patient remained at Wanganui till the 6th of March, and was then sent to the General Hospital at Auckland. Staff Assistant-Surgeon J. Wallace briefly reports from Wanganui, that :—

"Since admission the case has gone on as favourably as could have been expected. There was slight constitutional fever on the onset. The suppuration has not been abnormally great. The patient's health has been on the whole good. At present there is very little discharge, cicatrization is advancing slowly, and he has no pain in the part. A sinus two inches in length passes from the centre of the incision obliquely upwards and backwards.

"The treatment has been position, rest, water dressing; sinus injected with weak solution of sulphate of copper; secondary hæmorrhage checked by exposure to atmosphere."

The source of the secondary hæmorrhage alluded to is not mentioned.

The patient remained in the General Hospital at Auckland until the 1st of September, 1865, when he embarked for England in the transport ship "Bombay." He arrived at the Royal Victoria Hospital, Netley, on the 6th of December, 1865.

The following additional particulars in the history of the case and state of the injured limb were obtained by examination and careful observation while the patient was at Netley:—

The ball by which the wound was inflicted was circular in shape and when removed from the bone in which it was embedded, was found to have been compressed into a somewhat triangular form. The distance from which it was fired seems to have been about 100 yards. When he received the wound he had just discharged his rifle and was in the act of lowering the weapon from the firing position. The troops at the time were subjected to a cross fire, and this fact accounts for the ball striking him on the outside of the arm. He did not suffer any severe pain on the receipt of the wound; but thought a small fragment of stone had struck him on the arm, which at once dropped by his side; he had no idea of the serious nature of the injury until his attention was further directed to it by finding blood trickling down his sleeve. He was able to walk from the field to the hospital marquee about 800 or 900 yards. There seems to have been from the man's account a good deal of bleeding immediately after the receipt of the wound. The operation was performed, as stated in the abstract history above quoted, 19 hours after the wound was inflicted, by a single incision at the inner margin of the deltoid, and whilst the patient was under the influence of chloroform. Staff-Surgeon A. D. Home, V.C., C.B., performed the operation.

Condition of the Patient while in the Royal Victoria Hospital.—The patient's left arm is just half an inch shorter than the right when hanging in a dependent position by his side; the shoulder is of course very flat from the loss of the head of the humerus and from wasting of the surrounding muscles, especially of the deltoid muscle. The coracoid process is much enlarged. The long tendon of the biceps muscle can be felt distinctly within the space between the upper extremity of the humerus and the glenoid cavity. It is flaccid and loose under ordinary conditions; less so, but still not tense, when the muscle is voluntarily put into action so far as its present state admits of it being exerted. This condition is evidently owing to the absence of the globular head of the humerus, which, in the natural condition, not only serves to give the tendon support but also to increase the power of that part of the muscle with which it is connected. On pressing the tendon back by means of the finger into the hollow left by the removal of the head of the humerus, the tendon can be rendered tense; and on doing this the patient at once says that he feels more power in bending the elbow, and also in supinating the arm after the hand has been placed in a prone position. The finger by pressing the tendon backwards to a certain extent seems to effect what in a healthy limb is effected by the projection forwards of the tendon over the head of the humerus. Time alone can show whether the long bicipital tendon will become shorter and adapt itself to the altered circumstances in which it has been placed by the operative interference of the surgeon. The biceps muscle acts well, however, at the present time, particularly when the comparatively limited period which has elapsed since the operation, and the small opportunity there has been of practising the use of the muscle are considered.

The patient can not only of his own accord flex the forearm with considerable vigour, but, when the arm and forearm are maintained in the position of a right angle, the hand can sustain a weight of 14lbs. continuously without inconvenience.

When the arm is depending by the side, the man is able to lift a weight of 28lbs. Pronation and supination of the forearm, and all the movements of the wrist and fingers, are complete. The forearm can be straightened out in a continuous line with the arm. For some time the patient states there remained considerable stiffness about the elbow joint and difficulty of stretching out the arm, but that has now disappeared. Rotation of the arm when the humerus is allowed to hang vertically, cannot be effected, and abduction of the arm from the side is also necessarily lost; in the one case, from the removal of the tuberosities into which the rotator muscles of the scapular region were inserted; in the other, from the absence of the point of support, viz., the head of the humerus, upon which the action of the deltoid for raising the arm mainly depends.

The cicatrix of the wound of entrance of the bullet is situated at a distance of three inches and a quarter from the margin of the acromion process, and is near to the point of insertion of the deltoid muscle; it is rather longitudinal in shape and somewhat valvular in character, the upper edge being more distinctly marked than the lower, showing that the ball entered obliquely and travelled upwards. The cicatrix of the incision is on the anterior aspect of the arm, commencing on a level with the coracoid process, and one-eighth of an inch only from the outer margin of this prominence; the incision may, indeed, be said to commence at the outer edge of the coracoid process itself in its present enlarged condition. The incision descends for a distance of five inches and a-half from that point passing obliquely outwards, so as for a considerable part of its course to be along the outer margin of the biceps muscle, and over the situation of its long tendinous origin. It is now quite healed.

The patient suffers no pain or inconvenience whatever as far as the wound is concerned, and possesses an extremely useful limb, considering the severe nature of the injury which it sustained.

The patient was invalided from the army as a pensioner, and left Netley for his place of residence at 118, Praed Street, Paddington, on the 17th January, 1866.

Description of the Head and adjoining portion of the left Humerus, removed by Resection from Private G. Box, 50th Regiment, by Staff Surgeon A. D. Home, V.C., C.B., and presented by him to the Museum of the Army Medical Department at Netley.

The specimen consists of nearly the entire articulating head, with about three-fourths of the circumference of the neck, and about one inch and a half of a segment of the shaft of a left humerus. A slight portion of the articulating surface, with part of the neck, has been removed by the saw; the remaining absent portion of the neck has been in part driven in and in part carried away by the projectile. The whole of the structure of both tubercles, although injured, is retained in the specimen.

The force of the bullet has evidently been chiefly expended at the outer and posterior aspect of the greater tubercle. This situation is marked by a deep indentation, the margin of which has for three fourths of its circumference a circular outline, evidently corresponding with the general shape of the bullet.

The depression is incomplete below, and has the aspect of having been continuous, with a groove made by the bullet. This grooved portion of the bone has been sawn across in the course of the resection. The great tubercle itself has been split deeply across, the fissure being continued in a circular direction through the neck, and round into the hollow depression before described, in which the bullet appears to have rested. This part of the great tubercle is completely detached, and at the time of the injury has evidently been forced upwards toward the glenoid fossa. The smaller tubercle and the groove between the two tubercles is entire.

The articulating surface of the head has escaped from being fractured, or

even fissured; but at the spot where the bullet became impacted, some of the bony structure of the great tubercle has been driven into the cancellated structure of the articulating head of the bone.

A portion of the outer shell of the shaft, adjoining the greater tubercle, has also been bent inwards towards the cancelli. Although fractured, this portion is still in connection with the surface, from which it has been partially detached.

The saw has been used very obliquely, so that on the outer and anterior aspect of the bone, about an inch and a half of the shaft, including the two tubercles, are retained; while on the inner and posterior aspect the saw has made its way so far upwards as to trench upon and remove a small portion of the articulating surface itself.

This specimen again illustrates the frequent occurrence of the articulating surface escaping fracture when the force is applied below the limit of the neck of the bone. Serious injury, was, however, inflicted on the head of the humerus, owing to part of the great tubercle being forced into its cancellated structure, as mentioned above, notwithstanding that its cartilaginous surface was unbroken. No illustration is afforded of the extent to which the splintering occurred downwards; but it is sufficiently obvious that the fissuring extended below the line of resection, and the fact that it did so extend is recorded in the following descriptive remarks by Staff Surgeon Home, which accompanied the preparation:—

"Auckland, New Zealand, July 21, 1865.

"Preparation illustrating the subject of Gunshot Injuries of large Joints. Head of Humerus (left) Resected for Gunshot Wound.

"The shaft of the humerus will be noticed split up just to and very slightly within the joint. The fracture extended an inch further down the shaft of the bone than is shown in the preparation. *After removal of the head of the bone, it was necessary to saw off about an inch, or a little more, of the shaft, into which the downward splintering extended.*

(Signed) "A. D. HOME, Staff Surgeon."

Neither the portion of the shaft referred to in Dr. Home's remarks, nor the bullet which caused the injuries, were forwarded with the preparation of the head of the humerus to Netley.

Case No. 3.—Report of the Case of No. 4549, Private J. Flynn, 50th Regiment, aged 29 years, of 9 years' service, who was admitted on the 6th of December, 1865, at the Royal Victoria Hospital, labouring under the effects of Resection of the left Elbow-joint after a Gunshot Wound.

Previous History.—Private Flynn, a native of Ireland, enlisted into the 50th Regiment in January, 1855. His health previous to enlistment was always exceedingly good. A few months after enlistment he went to the Crimea, where he remained till the close of the operations, without being a single day absent from duty on account of sickness or injury, and then returned home.

In June, 1857, he went with his regiment to Ceylon, where he remained six years. In October, 1863, his regiment was ordered to New Zealand, and landed at Auckland in November of the same year.

History of Wound.—His health remained good until the 25th of January, 1865, when about 3 P.M. he received a wound of the left elbow in the attack made by the Maories on the camp at Nukumaru. When he was struck he was kneeling upon the right knee, his left elbow (the wounded one) resting upon the anterior part of his right thigh. He was holding his rifle with both hands, waiting for the opportunity of a shot in what is called the kneeling position, he not being able to fire in consequence of some of the British troops being in front of him. The enemy were in the bush still further in front, and nearly on the same level of ground. The shot appeared to come from the left of his position, but the distance from which it was fired was quite uncertain. The wound caused severe pain at the time it was inflicted. The patient was able to walk a short distance to the rear, carrying his rifle in the

hand of the uninjured arm without assistance, but he then became so faint as to be unable to proceed farther. From this point he was assisted by two men into the camp, distant about two hundred yards. According to the man's statement, he lost a good deal of blood from the wound; but his faintness was partly due to the fact of his having received scarcely any food, and hardly any rest, for twenty-four hours previous to the rebel attack.

After being about two hours in camp, and having somewhat recovered from the shock attendant upon the injury, he underwent a primary operation of resection of the elbow. The man states that he himself at first objected to having anything done to the joint; but on the Principal Medical Officer and other surgeons pointing out to him it was necessary, he assented. The operation was performed by daylight of the same day on which he was wounded, by Staff-Surgeon A. D. Home, V.C., C.B., assisted by Staff-Surgeon Mackinnon, C.B. He took chloroform, and did not feel any pain during its performance. The operation, as shown by the cicatrix on the posterior part of the joint, was performed by one straight incision about six inches in length, immediately over the lower end of the humerus and upper part of the ulna, the principal part of it being in the latter situation. Two days after the operation the patient was removed to the General Hospital at Wanganui, distant about twenty miles. The arm was well bandaged, and carried in an arm-sling. The journey was performed in a Commissariat baggage-cart without springs, the few ambulance spring carts which were with the troops being occupied by other wounded. The jolting of the conveyance caused very great pain in the wounded arm.

Private F. remained in the hospital at Wanganui five months. The wound was at first treated by simple water dressing, with occasional poultices. During this period of his treatment the joint was several times attacked by inflammation, on the subsidence of which copious discharge took place from the wound. Both at Wanganui and for the two days that he remained at Nukumaru after the operation, the arm was arranged to rest in an extended position beside him on the bed, supported by sand-bags. At one time it was attempted to keep the joint flexed, but from some reason or other unknown to the patient that procedure was very soon discarded. Whilst at Wanganui three small pieces of bone were discharged through the incision made at the back of the joint; these were not shown to his medical attendant, as the man states he was afraid he might have had to undergo another operation if he had done so. After being nearly three months in hospital at Wanganui he was put under chloroform, and the capability of motion in the articulation observed. The abstract account sent with the patient states that the arm "could not be flexed to less than a right angle, from the radius apparently impinging against the humerus, nor extended beyond an angle of 70° or 75°."

From Wanganui the patient was removed on the 22nd of August, 1865, to the General Hospital at Auckland. The wound was then completely healed up. For the three months he was in Auckland prior to being sent home, he was allowed to move freely about, the arm being retained in a sling. He left New Zealand on the 1st of September, 1865, and was admitted into Netley Hospital on the 6th December, 1865. During the voyage home Private F. had a severe fall, which caused increased pain in the injured joint for several days afterwards.

State on Admission at the Royal Victoria Hospital.—General condition healthy. The integument of the patient's chest, and of the upper part of the back, is marked by extensive patches of light reddish-brown discoloration, not elevated perceptibly to the touch, and attended with a very slight mealy desquamation, but not otherwise causing any inconvenience. It is simply a form of liver spot, or chloasma, probably the result of exposure, and has been not unfrequently met with among the invalids who have lately returned from New Zealand.

The patient's left arm (the one wounded) at once, on casual observation, attracts attention from the appearance it presents of almost complete uselessness. On closer examination, and on comparing the injured with the sound arm, the following are the points chiefly noticeable:—The muscles surrounding the shoulder joint, especially the deltoid, as well as the muscles on the front and posterior aspects of the upper arm, are considerably wasted. The principal muscles of the forearm are not perceptibly smaller than those on the

sound side. Their origins and insertions having been hardly at all interfered with, their actions (principally extension and flexion of the fingers) are capable of being performed nearly as well on the one side as on the other.

The posterior aspect of the left elbow-joint is flatter than that of the right elbow in consequence of the loss of the olecranon process. The left shoulder is elevated above the level of the right, probably in consequence of the position assumed by the arm during the treatment after the operation, and probably also by the scapular muscles, and the scapula itself, being drawn upwards to assist in supporting the weight of the injured forearm.

The left upper extremity is manifestly shorter than the right upper extremity, as a result of the resection of the elbow. This shortening is found on examination to be due to loss of bone from the upper part of the forearm, and not from the humerus, which can be plainly felt to be entire. The condyles of this bone corresponds in size, and in all other features, with those of the humerus on the sound side. The elevation of the shoulder before described makes the difference in length between the right and left arms appear greater than it really is.

The following are some of the principal measurements taken for the purpose of determining with accuracy the difference in length between the two limbs. They are the result of very careful and frequently repeated observations.*

	Sound Arm.	Wounded Arm.
	Inches.	Inches.
From acromial end of ulna to tip of middle finger	30¼	28¼
„ greater tuberosity of humerus to outer condyle ..	12¼	12¼
„ outer condyle to styloid process of radius	10⅛	9⅞
„ inner condyle to styloid process of ulna	10⅜	9¼

These measurements indicate that more than one inch and a half or two

* This case well illustrates what contradictory impressions are liable to be made among us concerning professional matters of fact, when the subjects to which they bear reference are not verified and recorded at the time they are presented to our notice. In the instance before us, one of the two very able and experienced surgeons engaged in the performance of the resection is fully impressed with the belief that "fully four inches of the ulna and olecranon, and about an inch of the head and neck of the radius," were removed. The other is equally convinced, beyond all doubt, that "seeing at the time of the operation the head of the radius was quite sound and untouched, it was decided to leave it intact, and it was not removed." Both surgeons had the same opportunity of observing each step of the operation at the time it was performed; recollection, however, has led them some months afterwards to record diametrically opposite statements as to the nature of the surgical interference resorted to, so far as the radius was concerned. In consequence of the different convictions on this subject held by the surgeons above alluded to, as well as by others whose recollections were subsequently appealed to on the matter, the several measurements recorded in the history of the case were made with the utmost precision, and especial care was taken in examining the condition and relative position of all the structures composing the partially anchylosed articulation. There can be little doubt but that a better chance of a more favourable result would have been afforded had the articulating extremity of the humerus been resected, and more space left for the formation of the artificial articulation, for partial resections are established not only to be more hazardous during the subsequent stages of treatment, but also to be finally less successful as regards mobility, than total resections; but the hesitation to remove structures which had entirely escaped from injury by the projectile can readily be understood. A determination of the principles which should guide the performance of resections, in order to obtain the surest prospect of security, mobility in the new joints, can be best arrived at, perhaps, by studying the manner in which the new joints are formed. Those who are interested in observations on the process of repair after resection of joints and in the substance of bones will find an exhaustive treatise on the subject by Dr. Albrecht Wagner of Berlin. This treatise has been translated by T. Holmes, Esq., F.R.C.S., and was printed in 1859 by the New Sydenham Society, in the fifth volume of their publications.—T. L.

inches of the ulna have been removed in this case. They also show that a portion of the head of the radius has been removed, and that the portion taken away from this bone did not at most exceed one-half of an inch in depth. The bones of the forearm are found to be so drawn up and approximated to the humerus and so far anchylosed together, that scarcely any power of motion is preserved in the new joint. The line of division between the humerus and the ulna can be felt when the finger is placed upon the back of the forearm by means of a slight transverse depression which exists between them. The arm and forearm are at present fixed at a very obtuse angle. They cannot be brought into line the one with the other; when extended to the utmost by the hand of the surgeon, the forearm still forms an angle of 160° with the upper arm. Flexion also is very limited when made in the same manner; the angle formed in extreme flexion is one of 140°. The arc of power of motion is therefore limited to a space included within an angle of 20°. The incision at the back of the elbow, made during the operation, is now quite healed. The cicatrix is four inches and three-quarters in length, and occupies much more of the ulna region of the forearm than of the arm above the elbow, only one inch and three-quarters being on the latter situation. The incision was made intentionally in this position, as previously to the operation it was diagnosed that the humerus had not been injured. The cicatrix of the wound of entrance of the bullet must have somewhat changed its position relatively to the humerus since the performance of the operation of excision and during the process of healing; it now very nearly corresponds to the outer condyle, so that if this had been its original position the humerus could not have escaped from being injured. This cicatrix is prolonged at its superior part from an incision having been made for the purpose of extending the opening and giving exit to pus. The cicatrix of exit of the bullet is situated on the same level as that of the inner condyle, but about one inch anterior to it; it is very small, circular, and radiated; like the other, it also has changed its position with regard to the humerus. The amount of flexion of the elbow-joint which the patient is himself capable of performing, is very slight indeed, being through an arc only of about 10°; and, as before stated, but little more can be procured by the passive application of force. All the motions of the wrist-joint are well preserved, as are also those of the fingers. The movement of the shoulder is somewhat limited. This condition appears to be chiefly due to the length of time during which the limb was in a fixed and extended position whilst the elbow was under treatment.

The patient complained that he constantly suffered aching and uneasiness, and occasionally severe pain, especially at night, in the neighbourhood of the injured joint. This pain, when severe, passed down the arm as far as the ends of the fingers. The pain was also accompanied by a feeling of numbness along the ulnar aspect of the forearm, which extended to the palmar surface of the little finger and of the ulnar side of the ring finger, as well as to the dorsal aspect of both little and ring fingers. This sensation of numbness was constant and indicated some abnormal stretching or lesion of the ulnar nerve. The patient stated that this pain and numbness did not arise until after the fall he received on board ship, so that it seemed clear that the nerve could not have been injured during the operation, but that the symptoms mentioned were rather attributable to the effects of inflammation excited by the fall. An enlargement existed, probably from bony exudation, at the ulnar side of the resected head of the ulnar; and as slight friction or pressure over this spot caused considerable pain along the course of the ulnar nerve, it was obvious that the nerve would readily be subjected to injury by such an accident as a fall, owing to the superficial situation in which it had become placed by the new condition of the bone on which this portion of it was supported.

The treatment of the case at Netley chiefly consisted of the use of arm baths, at a temperature of 100° F., every morning and evening. The baths were employed for half-an-hour on each occasion, and were accompanied with shampooing and careful passive motion. After removal from the bath the elbow and forearm were rubbed with a liniment consisting of equal parts of glycerine and olive oil, to which anodyne ingredients were occasionally added. Under this local treatment the pain and numbness became gradually lessened, and on his leaving the hospital on the 29th of January, 1866, these symptoms

had nearly disappeared. The general condition of the elbow was not, however, improved, the movements of flexion and extension remaining as limited as they were at the time of his first admission to Netley.

Private Flynn was invalided from Netley on the 28th of January, 1866, his intended residence being Killarney, Kerry, Ireland.

CASE OF RESECTION OF THE RIGHT SHOULDER-JOINT.

ON ACCOUNT OF INJURY BY A CHARGE OF SMALL SHOT.

By Surgeon ARTHUR RUDGE, 9th Bengal Royal Artillery, Shorncliffe.

SAPPER J. H., 10th Company Royal Engineers; age, 26 years; service, 2½ years; a thickset, healthy man, of sanguine temperament, was brought to the hospital of the 9th Brigade Royal Artillery, on the evening of the 29th of June, 1865, having sustained a gunshot wound through the right axilla. The injury was purely accidental. The man was shooting rats with a friend, and whilst in the act of lighting his pipe, with the gun under his arm, the butt resting on the ground and the muzzle under the axilla, it exploded.

The axillary artery escaped injury, the wound being anterior and internal to the vessel. The muscles and soft parts were much lacerated. The wound of entrance was almost circular in form, about the size of half-a-crown, with serrated powder-stained edges inverted; whilst the wound of exit was considerably larger, from four to five inches in diameter, jagged and everted, with jagged muscular fibre and osseous substance protruding from it. The hæmorrhage at first was very profuse (venous), but in a short time gave place to mere oozing. There was considerable difficulty in ascertaining the amount of injury the man had sustained; and, on a consultation with the Principal Medical Officer and my colleagues, operative measures were not deemed advisable. A full opiate was administered, and quiet watching observed. Little or no reaction set in, his pulse never exceeding 90. Respiration was quiet throughout. His skin acted naturally. Cold water dressing was kept constantly to the wounds, which suppurated in a healthy manner.

Fourteen days after the accident, in consultation with my colleagues, the state of the parts were more definitely ascertained, when it was found that the glenoid cavity and clavicle were apparently uninjured, but that the head of the humerus had been completely shattered. Operative measures were then decided upon, with a view of forming a false joint.

The patient having been with much difficulty placed under chloroform, the wound of exit (which was in that triangular space formed by the upper edge of the pectoral muscles, clavicle, and deltoid muscles) was enlarged by an incision three inches in length. The incision was made from the outer edge of this wound downwards, and outwards through the deltoid muscle. The long tendon of the biceps was uninjured and preserved. The head and about two inches and a half of the shaft of the humerus were found broken up into small pieces; the fragments of bone were consequently dissected away, and the spiculated end of the shaft cut off with a chain saw. The glenoid cavity and scapulo-clavicular articulation were found to be entire. Very little hæmorrhage took place, and but slight shock to the system.

From this date up to his discharge from hospital, on the sixty-eighth day after his admission, he had not a single bad symptom; the wounds healed and granulated in the most healthy manner; and he began to have considerable mobility of his shoulder, and could, whilst in hospital, raise his forearm and hand up to his face.

He was discharged the service on the 2nd December last; and it was very flattering to observe that he had almost entirely regained the use of his forearm; he could rotate the arm, though very slightly, could supinate and abduct the limb to the extent of an angle of 45 degrees, could lift a bucket of water, feed himself, and write well, play the pianoforte, and, in fact, with very little exception, the entire use of the arm had been restored. From an external

view of the patient it would be impossible to tell that he had ever been operated upon, as no visible deformity exists.

On the 15th of January, 1866, he states by letter that he is getting more strength daily in his arm, and has never suffered the slightest uneasiness or pain since his discharge.

The case has been exceedingly interesting throughout, and forcibly illustrates what nature can repair, assisted by a little conservative surgery.

Remarks by Deputy-Inspector General Longmore, Professor of Military Surgery.

The fragments of bone removed in the foregoing case, together with a specimen of the shot by which the wound was inflicted, were forwarded to the Museum at Netley.

The preparation forwarded by Surgeon Rudge consists of fragments of the articulating head, tuberosities, and of portion of the shaft of a right humerus. The fragments are about twenty-five in number. They vary in size from a length of two inches and a quarter by two inches in breadth, to others of not more than an eighth of an inch in length and breadth. The two largest fragments consist of portions of the head of the bone. Attached to one of these is a part of the neck, and a splintered portion of the shaft. The three largest portions of the shaft are each about two inches in length by about half an-inch in breadth. The fragments are of every description of form. Those chiefly consisting of cancellated structure are very irregular in shape, while there is a general tendency to the shape of elongated splinters, with sharp points and thinly bevelled edges in those fragments which have been detached from the shaft. One splinter from the shaft exhibits the effect of section by the saw, about half the circumference of the bone being included in it. The head of this bone is mainly split into two portions; these are completely detached from each other. Each of these portions exhibit fissures at right angles to the main line of separation, but the divided portions are held together by the cartilage covering the bone. The cartilage has partly disappeared in some positions, and the osseous surfaces generally exhibit the usual marks of the process of sequestration. The internal structure of the head of the bone is greatly broken up, and presents several leaden shot scattered and deeply embedded in its cancelli. These shot are lodged a short distance beneath the articulating surface. None of the shot appear to have passed through the cartilage. The greater tubercle of the bone is much shattered, but the parts are held together by the tendenous fibres inserted into it.

The manner in which the surface of the head of the bone has been rent asunder and spread open, the broken-up condition of the cancellated structure beneath it, and the position of the shot which are still lodged, sufficiently show that the force has been chiefly exerted from below upwards, and this accords with the description in the report of the case of the position of the gun at the moment of its discharge. The close proximity of the muzzle to the axilla also explains the remarkably great disintegration and comminution of the bone effected by the shot, notwithstanding their small size. The general appearance of the injury in this instance contrasts greatly with the appearance ordinarily presented by the effects of penetration, or perforation, by a musket ball in the same situation.

The size of the shot by which the wound was caused was that technically known as No. 6. Judging from some specimens found among the fragments of bone removed, the average weight was about two grains each. The shot extracted were much flattened by collision with the bone structure.

CASE OF EXTENSIVE FRACTURE OF THE SKULL.

PARTIAL RECOVERY OF INTELLIGENCE—DEATH FROM TETANUS AFTER FOUR MONTHS—COMPLETE BONY UNION.

By Assistant-Surgeon J. A. MARSTON, M.D., R.A.

ON the afternoon of May 31, 1865, Gunner J. S. was admitted into hospital suffering from the effects of a fall. It appeared that he had only just

arrived at Portsmouth from India, in company with invalids and time-expired men. The men had "fallen in" near where the transport was moored, and Gunner S. had left the ranks after inspection, and sat down with another gunner upon a chain close to a dry dock. They were joined by a third soldier, who had just placed his hand upon the chain when it gave way, and precipitated the two first-named men to the bottom of the dock—a fall of some 40 to 60 feet. On admission, Gunner S. was found to have sustained a severe comminuted fracture of both bones of the right leg. There was a laceration of the scalp also, from ear to ear; and he exhibited symptoms indicative of fracture of the base of the skull, viz., bleeding from the nose, mouth, and ears, deep coma, &c. The bleeding was slight from the right, but continued for nearly a week from the left ear—free and crimson-coloured for two days, and for three days afterwards a pinkish water wept from it, sufficient to stain the pillow. There was some return of consciousness on June 5, and from that time he gradually improved, regaining a considerable degree of intelligence, power of speech, and motion. At the time he was seized with tetanus he could express himself well, although his voice and pronunciation were very peculiar, and he understood what was said to him. He made a correct use of all his senses, as far as one could determine; but he was hemiplegic on the right side of the face and body. There was slight ptosis of the left eyelid, some external strabismus of that eyeball, and the tongue was protruded *towards* the *left* side. He suffered a great deal from a kind of *paralysis agitans*, the hands, limbs, and head constantly shaking; and considerable rigidity of the flexors of the right side was apparent, and was upon the increase at the time of his death. He did not appear to have entire command over the rectum and bladder. At the time of his death there were three or four external sores about the injured leg, and three small bed sores. On the morning of the 10th of October, at half-past seven, he was noticed to have some difficulty in opening his mouth. This symptom of tetanus increased rapidly, and he died of tetanus at 9 P.M. of the 11th.

Post-mortem Examination.—There was an oval fracture of the left parietal bone, at its antero-inferior angle. At the lower part the continuation of the fracture could be traced by two lines running in the following directions:—The anterior ran across the great wing of the sphenoid, passing close in front of the foramen rotundum, to the apex of the petrous bone, where it stopped at the foramen lacer: basis cranii. The posterior was traced along the outer part of the great wing of the sphenoid, at its junction with the squamous bone, across the base of the petrous, along the groove of the lateral sinus, behind and around the foramen magnum, and across as far as the outer part of the petrous bone of the opposite (right) side. At the left and posterior margin of the foramen magnum the line of fracture was not level, one edge of the occipital bone being somewhat tilted upwards, that is to say, encroaching upon the interior of the cranium. The somewhat serrated edge of the fractured bone was nearly smoothed down, and at this part the union did not appear to be bony, for a knife could be made to penetrate it. With this exception, the whole tract of this very extensive fracture appeared to be completely and firmly united by bone. No deposits of new material encroached upon the interior of the skull, but the line of the fracture appeared like the mark of an obliterated suture. Even where the broken portions of the occipital were not perfectly level, there was no roughness on the inside, but the union had been accomplished by the interposition of material between the parts in contact, and the bevelling off of the raised edge. The bone about the neighbourhood of the fractured parietal was remarkably thin in places: a knife was easily passed through it. This was the result probably of cicatritial absorption.

The remains of two spots of extravasated blood existed upon the inner surface of the arachnoid at two points, viz., about the left middle fossa, and the posterior fossa. At the part corresponding with the fracture in the anterior angle of the left parietal bone, the dura mater and membranes were adherent. Upon separating them the remains of a small, firm, yellowish coagulum existed between the dura mater and bone; and some yellowish lymph, discoloured by old effused blood, glued the arachnoid, pia mater, and brain together. From the appearance, laceration of the membranes and slight hæmorrhage had evidently taken place here. The central tissue of the

posterior border of the anterior and the adjoining border of the middle lobe (at the left fissure of Sylvius) was very much softened.

The fractured bones of the right leg were in the following state:—The fibula comminuted, the two ends overriding, with fragments between; no union: the tibia in process of union at an obtuse angle, but still moveable.

It is highly probable that the fracture of the skull was not the result of one but of two blows. The walls of the dock slope inwards, with large steps, so that a falling body might be struck many times; and the elevation of the fractured edge at the occipital foramen also indicates a forcible impulsion of the spinal column against the condyles of that bone. The fracture, from the anterior inferior angle of the parietal bone, extended to the middle fossa, and across the petrous bone of the left side—the remainder of the fracture being caused by the force acting upon the occipital bone.

Unquestionably cases have recovered after fracture of the base, but I question whether there be any instance of a patient's living for upwards of four months, and regaining a considerable degree of intelligence and muscular power, after such an extensive fracture as this.

Again, the complete union is noteworthy. The case is not, however, unique in this respect. I believe the late Professor Lawrie of Glasgow published a case in which complete bony union took place in three months after a fracture of the base of skull. The state of the remaining viscera calls for no remarks.

The removal of the injured parts of the skull was impracticable without a good deal of mutilation. As the parents and friends of the unfortunate man were expected on the morrow, it was not thought desirable to do this.

CASE OF POPLITEAL ANEURISM.

Forced Flexion unsuccessful—Ligature of the Femoral Artery—Recovery.

By Assistant-Surgeon Lane, 2nd Battalion Grenadier Guards.

Private S. V., aged 26 years, was admitted into hospital at Shorncliffe on the 21st of January, 1865. He complained of pain in the left leg and foot, and the leg and ankle were slightly red and swollen. On the 23rd he directed my attention to a swelling in the popliteal space, which on examination proved to be an aneurism of the popliteal artery.

In January, 1864, I was unsuccessful in the treatment of a case of popliteal aneurism by compression of the femoral artery with the various instruments invented for that purpose. I therefore in the present case determined to try the plan suggested by Mr. Ernest Hart, and flex the leg on the thigh until the heel nearly touched the buttock, keeping it firmly in that position by means of bandages. This treatment was commenced on the 23rd. On the 28th I examined the leg. The pulsation had somewhat diminished, and the aneurismal tumour was decidedly firmer, but larger. I then tightened the bandage and to assist in still further obstructing the flow of blood, I attached a tourniquet pad to the under surface of an ordinary 7-lb. weight, and covered them with leather. I then marked with ink the position of the femoral in the thigh, and directed the man to keep the weight on the spot indicated.

On the 30th there was much less pulsation, and the sac was firmer but larger, which was no doubt owing to deposition of fibrine. The patient stated he was free from pain, and experienced but little inconvenience from the forced position in which the limb had been placed.

31st. Rather more pulsation. Fearing that the bandage as adjusted allowed of too much motion, I rebandaged the leg on the thigh, and well starched the bandage. The tumour appeared to have been forced from the popliteal space to the inner side of the knee-joint, and it was in this position that pulsation could be felt.

From the 1st of February the pulsation diminished rapidly, and on the 4th

it could not be detected; but the tumour had greatly increased in size. On the 7th, as there had been no return of the pulsation, and there was both pain and swelling of the knee-joint, I loosened the bandage, and let the leg down about four inches. On the 9th pulsation had reappeared, and the leg was again placed in the flexed position. On the 11th pulsation had ceased, but on the 14th it again returned without any apparent cause; and the aneurismal tumour so rapidly increased in size, without any diminution in the pulsation, that I deemed it necessary to ligature the femoral. Very little blood was lost during the operation, and the wound was brought together with the silver wire suture. The tumour previous to the operation was nearly as large as an ordinary cocoa-nut, and I am induced to think from its size that the sac must have given way. Absorption was very rapid. Seven days after the operation it was not much larger than an orange, and on the 28th day it could scarcely be felt. The limb, from having been in the flexed position for so long a time, was very much contracted. I experienced much difficulty in straightening it. I had to place the man under the influence of chloroform, and to use considerable force to effect my object. If at any time I should have another case of popliteal aneurism under treatment, I think I should still be disposed to give another trial to the treatment by forced flexion, but not for a longer period than eight or nine days. If pulsation does not by that time quite cease, I should deligate the artery, trusting to the collateral circulation.

CASE OF LITHOTOMY.

AT THE GENERAL MILITARY HOSPITAL, DUBLIN.

By Staff Assistant-Surgeon A. CROKER, F.R.C.S.I.

J. M., an English boy, aged fourteen, belonging to the 64th Regiment, of lymphatic temperament, delicate appearance, and very young-looking, was transferred from the Curragh to Dublin (to General Hospital, Phœnix Park) on 13th February, 1866, on the recommendation of the Deputy Inspector-General of Hospitals at the former station.

The history sent with him states that he has suffered from the usual symptoms of "stone" for more than two years, and that a calculus could be felt either with the sound or by a finger in the rectum.

On the 14th February, on admission his symptoms were as follow:—

Frequent micturition at night, and incontinence during the day; urine abundant, pale, of sp. gr. 1012, neutral reaction, and free from any trace of albumen or sugar, without mucus, or lateritious deposit. The incontinence of urine occurs, also, during sleep, and the stream is suddenly arrested, now and then, during micturition. Neither pain in, nor itching of "*glans penis*," are present; he has more or less persistent thirst, and is of anæmic complexion and aspect. The presence of a stone, of uncertain size (supposed to be about the size of the last joint of the thumb) was readily detected in the "*bas fond*" of bladder, with a No. 5 silver catheter (a sufficiently small and properly curved, sound, for so young a subject, not being at hand), while the finger, passed into the rectum, also detected the presence of the calculus.

The chief indication to be fulfilled, seemed to be that of improving his health and strength, thus preparing him for the unavoidable operation. This was sought by the exhibition, thrice daily, of five grains of the citrate of quinine and iron, in solution. He was placed on chicken diet with three ounces of port wine. The only thing else necessary was a hyoscyamus (twelve minims of tincture) and camphor (half an ounce of mixture) draught at bed time every night. Except an attack of subacute bronchitis, which threw him back a little for a few days, he steadily improved in general health, and gained flesh; the quantity of urine considerably decreased, and he acquired a better control over the bladder. I occasionally, but not often, introduced the silver catheter, with which I always detected the stone; and during the few

days, immediately prior to the operation, I introduced a small staff a couple of times.

On the 15th March, a consultation having been held, it was decided by the Deputy Inspector-General of Hospitals that the operation should take place on the 21st at noon, and, as the patient was under my care, that I was to operate. At 6 A.M., 21st March, he had an aperient draught (of castor oil and tincture of senna) which, unluckily, he vomited, so that he had to get a cathartic enema, at 8 A.M., which cleared out the lower bowel. He was allowed but a small morsel of bread, and a little tea, at 8·30 A.M. for breakfast, so as neither to keep him altogether fasting, nor yet to interfere with the action of the chloroform, by overloading his stomach. At the appointed hour, the little patient, having been tied in the usual position, was gradually brought under the influence of chloroform. The staff, one with a broad median groove, was next introduced, which proceeding caused the bladder to expel its contents (the patient having retained his urine, by request, for a couple of hours previously), which necessitated the withdrawal of the staff and the introduction of a catheter (silver), through which about six ounces of tepid water were injected. The staff was now re-introduced, and I commenced the primary incision at a point a little to the left of raphe, and rather less than an inch in front of the anus, carrying it downwards and outwards to mid-way between that aperture and the tuberosity of the left ischium, yet nearer the latter. I next lightly divided the cellular tissue, fat, and muscular fibres (transverse perinei, and outer fibres of superficial sphincter ani), and felt in the middle third of wound, with my left index finger-nail, for the groove in the staff, which, after slight difficulty, having found, I guided on the finger-nail the end of the sharp-pointed scalpel, with which I made a limited incision in the membranous portion of urethra, into which I slipped the finger-nail. In opening the urethra, I took care to depress the handle of the scalpel, in the manner recommended. I now laid aside the sharp-pointed, and with a *probe-ended scalpel* (such as is generally used by the Dublin surgeons) enlarged, to a little more than half an inch, the opening in the membranous part and prostrate, just sufficient to make room for my finger. The staff was now withdrawn, when I passed my left index finger through the deeper wound into the bladder (the water, which had been injected, escaping at the same time in a gush), in which I had some difficulty, the orifice being very tight, and apparently constricted by a firm ring (Dr. Tyrrell's "elastic ring," or Liston's "ligamentous bands"). I next felt the stone with the tip of the finger, and perceived it to be considerably larger than we had at all anticipated; and I hardly hoped to get it out without a further use of the scalpel. I, however, dilated the opening, as much as possible, with my finger, and introduced the *scoop*, thinking to hook out the stone on the end of my finger, but immediately found that this was impracticable. I next introduced the forceps—a wide-bladed and toothed pair—with which I caught the stone, at first by its short axis, and so that it was vertical in the bladder, and hitched against the ramus of the pubis. Having rectified this malposition, and catching the stone in its length, I proceeded to extract. Considerable traction, some degree of force, and see-saw motion had to be used, and the rectum became prolapsed, ere the stone was brought to light. No other calculus was found on exploring the bladder with the finger. Some arterial oozing occurred from the wound, and about three ounces of blood were lost during the operation and extraction; the oozing, however, soon ceased, on the insertion into the wound of a conical plug of lint, steeped in cold water. After some few minutes the patient was restored to consciousness, he having apparently fainted (although under the influence of the chloroform) from, perhaps, "*shock*" induced by the unavoidably protracted duration of the operation, which was not completed till near 1 o'clock, P.M., the first incision having been made about 12·25. After having been properly cleaned and dried, his ancles and knees tied together, he was lifted into bed (previously arranged with a water-proof cloth, and slip sheet, and warmed with a hot-water tin), and he was given a little warm wine and water. After the lapse of about an hour, he had seven minims of tincture of opium with twenty-five of chloric ether, and twenty of aromatic spirits of ammonia in camphor water, as he continued chilly, with a quick, feeble, pulse, and general depression. By the evening reaction was fully established, and there were some heat of skin and accelera-

tion of pulse. The urine was flowing freely and copiously from the wound, and he seemed to be progressing favourably on the whole. At 10·30 P.M., the report stated, that no hæmorrhage had occurred, and that the urine continued to flow abundantly through the wound: that there was but little pain, and he had taken some beef tea, milk, &c. His pulse was 120, and rather feeble, and he had slept a little after the opiate. He was ordered to be carefully watched during the night, and to have his beef-tea and wine at short intervals, in small quantities. On the 22nd March, 7·30 A.M., the report stated that he *had slept none*, and that a large quantity of urine had escaped through the wound during the night. He looked haggard and exhausted, pulse 130, and weak, tongue coated; he had taken no nourishment, except a little wine and lemonade. As the ward in which he was lying had a good deal of light and white walls, I ordered his removal to a smaller ward with less light and coloured walls, and gave strict injunctions for the maintenance of quiet, careful attention to his wants, as to his being kept thoroughly dry, &c. The windows opposite to, and near his bed, to be obscured with rugs, &c. He was ordered milk, brandy, beef-tea, lemonade, and a henbane draught at once. To have his milk, beef-tea, &c., in small quantities, at intervals; but if he sleeps, he is not to be disturbed. At 12 noon, of the same day, he had had no sleep, and the draught was repeated at once. At 2 P.M. he was still sleepless, and looked flushed, with considerable pyrexia, pulse very rapid, and slightly hard; and he complained of pain, increased by pressure in the left iliac region. Tongue coated with a yellowish or tawny fur; the urine, however, continued to escape freely through the wound. The case, at this juncture, presented very much the appearance of incipient *peritonitis*. He was ordered, immediately, a turpentine fomentation to the painful region, which was repeated at 6 P.M. (and about 10 P.M.); also a pill every second hour of the following: of calomel and opium, each five grains, and a sufficient quantity of mucilage to be divided into fifteen pills. At 11 P.M., the peritonitic symptoms were much less distinct, he had slept at intervals during the afternoon, from hour of getting the pills; he had also partaken, sparingly, of his nourishment, &c., the urine continued to pass freely through wound; thirst had diminished, and he was less feverish. To get two of his pills during night; food and drink in small quantities. On 23rd March, the report stated he slept well most of the night; tenderness and pain in left iliac region were greatly lessened; urine came through wound, which looked clean and healthy; pulse 94, and soft; tongue coated, but moist; face no longer flushed; spirits cheerful; skin a little dry; gums very slightly raised. To take a pill every eight hours, and half an ounce of this mixture every sixth or eighth hour: water of the acetate of ammonia half a drachm, aromatic spirits of ammonia two drachms, chloric ether a drachm and a-half, compound tincture of camphor a drachm and a-half, and an ounce and a-half each of camphor and cinnamon water. Turpentine stupes to be used thrice daily.

To have his nourishment and stimulants in small quantities, as before; cleanliness and dryness of his person, night dress, and bed-clothes, to be strictly observed. Silence and quiet maintained. 23rd March, 2 P.M., he continued to improve, obtaining refreshing sleep at intervals, and feeling a cheerful *sense of security*. The wound continuing clean, and apparently uni[illegible]g. At 5 P.M. and at 11 P.M. same report. On 24th and 25th, his progress was [illegible] dis favourable; all sign of inflammation had passed, the wound looked well [illegible]a of clean, and allowed, through its channel, a free flow of urine, and an occas[illegible] of oozing of it while at stool through the urethra. The bowels had acted by [illegible] of castor-oil; pulse, skin, and tongue natural, appetite already returning [illegible] continued to take one pill a day, and his mixture three times. He was [illegible] an egg for breakfast, additional beef-tea, &c., brandy as before. As [illegible] ordered to proceed, for duty, to the Curragh Camp, I handed patient o[illegible] the care of Staff Assistant-Surgeon W. C. Roe, from whom I received a [illegible] on the 6th April, to effect, that, "the patient was progressing well, on the whole, that the wound in perineo was healing, that the urine partly escaped through it, and partly through the urethra." I had another note from Dr. Roe on the 27th April, stating that "the incision has now healed completely, except a small fistulous opening at its anterior angle, through which urine escapes *occasionally*, guttatim," &c.

The calculus is of the following dimensions and composition: weight, 808·2 grains; long axis, 2 inches; short ditto, 1½ inches; greatest circumference, nearly 4 inches; colour, a yellowish fawn; shape, ovoid; surface generally smooth, with two or three glabrous patches. It is, altogether, not unlike a small sun-burnt potato.

A section shows it to consist of a nucleus, and several laminæ; the former of the size of a large bean, hard and dense, of irregular form and rough exterior, and composed of alternate whitish and dark layers, of which a little detritus, under microscope, exhibits some of the characters of oxalate of lime, and lithate of ammonia, also of lithic acid crystals. Those laminæ immediately inclosing the nucleus, were of much looser structure, and probably consists of phosphates (not very distinctly made out). Surrounding these last-mentioned laminæ, and forming the great bulk of calculus, were numerous hard, dense, and compressed layers, alternating, much like those of the nucleus, and presenting similar appearances, both under the microscope, and to the naked eye.

The calculus has been forwarded to Netley for the Museum there.

In conclusion, I would beg to add the following brief remarks on the foregoing case:—

1st. It is worthy of notice how insignificant were the symptoms and degree of distress which resulted from the presence in bladder of so large a stone.

2nd. It is probable that, considering the size, hardness, and weight of the calculus, its formation must have occupied a considerable time.

3rd. The alternations of the laminæ are somewhat remarkable.

4th. The extraordinary activity of the kidneys for some time before and after the operation.

5th. The comparative absence of untoward symptoms, and the general satisfactory results from the operation.

STRANGULATED FEMORAL OMENTAL HERNIA IN A FEMALE.

Removal of the Sac and its Contents.—Recovery.

Reported by Surgeon Deeble, 56th Regiment.

The patient suffered from the disease for five years; latterly it caused very little inconvenience, and, in consequence she discontinued wearing a truss. On the morning of the 9th of December, 1862, the tumour became strangulated; from its large globular and pedunculated shape, little hope was entertained of its reduction by the taxis; and owing to its exquisite tenderness chloroform was administered, and the taxis then gently tried, but without success. An operation was now considered advisable, and was immediately performed; a perpendicular incision was made to the extent of four inches, which fully exposed the sac; the neck of the sac and Gimbernat's ligament were divided, so that the finger could be easily introduced into the abdomen. Owing to adhesions with neighbouring parts reduction failed, the sac was laid op[illegible] and about three drachms of dark-coloured serum escaped; the omentum [illegible]found adherent to the sac, and both much disorganised; a second attempt [illegible]eduction failed, and it was considered advisable to remove both the sac [illegible] omentum, which was accordingly done; the remaining portion was well-[illegible]ged and passed back into the abdomen; no hæmorrhage ensued; the [illegible]id was brought together by sutures, a pad was placed above Poupart's [illegible]ment, and firmly secured by a bandage.

It appears unnecessary to go into further details regarding the after [illegible]tment, as the patient never manifested a bad symptom. The portion of [illegible]entum removed, together with the sac, weighed fourteen ounces.

Note by Professor Aitken, Army Medical School, Netley.

The preparation forwarded to the Museum of the Army Medical Department by Mr. Deeble consists of two parts, namely, first, a globular mass of omentum, consisting of several large fatty masses in close apposition with each

other; but the whole mass is capable of being unfolded into a continuous piece, having a small peduncule-like part. This peduncule-like part is evidently the cut-surface described in the operation performed by Mr. Deeble.

The other portion of the preparation consists of a greatly-thickened capsular structure, which enclosed the portion of omentum.

From the description of the operation, the history of the case and the appearance of the parts sent, it appears evident that the piece of omentum had gradually grown to the hypertrophied dimensions which it ultimately attained within the capsule; and the two structures (omentum and capsule) had no doubt increased in size simultaneously; and that, in the end, the omentum had grown so large as to render it impossible (after strangulation) for it to be returned within the cavity of the abdomen. After relief of the stricture, therefore, there was obviously no other course left for removal of the parts except complete ablation of omentum and sac.

CASE OF INTUSSUSCEPTION.

Intussusception in a Soldier thirty years of age, associated with a polypus of the intestine affected, and with the existence of numerous parasites (*the trichocephalus dispar*) in the caput cæcum.

Reported by Dr. R. C. Todd, Surgeon, 60th Royal Rifles, with Remarks by Wm. Aitken, M.D., Professor of Pathology, Army Medical School, Netley.

The history of this interesting case, as given in the abstract furnished by Dr. Todd, and forwarded to Netley (with the portion of the intestine involved in the intussusception), is as follows:—

"Private W. R., *4th Battalion 60th Royal Rifle Brigade*, had seven years service when he died on the *25th of July, 1865*, at Montreal. He was then thirty years of age; had been a hard liver, intemperate, and frequently a prisoner. He had married without leave, and had been four years at the station (Montreal) at which he died. In 1859 he suffered from hæmorrhoids, but generally was at his duty and not sickly. Early in July of this year (1865) he complained of diarrhœa, which was prevalent among the men at the time. For this affection he had medicine on two or three occasions, and reported himself relieved thereby.

"On the morning of the 14th of July he was admitted into hospital. His face was blanched, his lips bloodless, and his general aspect that of a man in the first stage of cholera. He complained then of nausea and diarrhœa. A diaphoretic stimulating draught containing an anodyne was administered, and the patient put to bed. The next day he complained of tenesmus and a feeling of fulness in the rectum. He had been two or three times during the night to the night-stool, but had passed only six ounces of fluid blood.

"The examination of the abdomen by manipulation caused no pain, nor revealed any abnormity; and I was unable to detect any signs of hæmorrhoids. The day following admission some feculent matter was passed. It was consistent in substance but pale in colour, and with it came away another discharge of blood. On the 17th (fourth day after admission) a large enema of lukewarm water was injected into the rectum, and an enormous discharge of fæces followed. The matter passed was pale, somewhat of the consistence of thick oatmeal porridge. In quantity it more than half filled the night-stool, and it was accompanied as before by a large flow of blood. During the two following days the symptoms were very mild. He still passed blood, and on two occasions scybala, but he had no pain, nor sickness of stomach, nor other symptoms which led me to suspect the real nature of his disease. Astringent medicines, such as *pil. plumb. acet. c. opio*, and enemata of warm water, together with purgatives, such as *pil. Rhei co.* with taraxicum were administered to check the bleeding, and bring on a healthy motion from the intestines. The bowels got rid of small portions of hardened fæces; but every effort was accompanied with the usual flow of blood.

"On the morning of the 23rd (tenth day after admission) the symptoms

were the same. A small piece of hardened fæces had come away, and blood also as before. A dose of castor-oil and turpentine was given; but the dose was followed by no satisfactory result. The bleeding certainly did not return; but in the afternoon vomiting set in, which before had been absent; and on the morning of the 25th (twelfth day after admission) the patient died.

"The vomites contained nothing that could be called stercoraceous. There was dark green bile mixed with the beef-tea, or milk, or wine, or whatever he had swallowed beforehand, but no feculent matter.

"About twelve hours before death head-symptoms set in. The pupils became enormously dilated, the bladder refused to act, jactitation ensued, and the vomiting, which had abated for some time, returned. He died comatose.

"*Post-mortem Appearances Seven Hours after Death*:—On opening the head about five ounces of sanious fluid escaped, and about three ounces more were found at the base of the brain. Recent lymph was to be seen in detached portions on the surface of the organ, and its blood-vessels were full; but the contained fluid was thin and watery. The brain itself was soft, so that it was with difficulty lifted. The lungs were healthy. The pericardium contained about three ounces of serum. The heart was firm, and the left ventricle felt as if in a state of tonic contraction. The right ventricle contained a very large polypoid coagulum. This fibrinous material had attached itself closely to the walls of the ventricle, and (chiefly anteriorly) to the *columnæ carneæ* and the *chordæ tendiniæ*. This coagulum filled very nearly the whole of the ventricle; and a similar coagulum was in process of formation in the left ventricle.

"The liver was enlarged, evidently the result of fatty degeneration. Its substance was shining smooth and friable. The gall-bladder contained a quantity of thick dark-green bile, which had been observed in the *vomites* during life.

"The stomach and small intestines were normal, except at the cæcum, where there was a large intussusception. The intestine was found pervious to a probe; and, although it was particularly pale, it had no external signs of inflammation; but in the part immediately about the seat of strangulation the mucous membrane had a raw look. It was thought desirable to preserve the intestine in as unmutilated a state as possible, and the parts involved were removed and forwarded to the office of the Army Medical Department for examination and preservation in the Museum at the Royal Victoria Hospital." —(*Dr. Todd's Abstract*).

Remarks by Dr. Aitken.

The case whose history is thus related by Dr. Todd is one of very great interest from several points of view.

I. Cases of intussusception *in the adult* are rare; so rare, indeed, that in the extensive experience of one of the largest civil hospitals in London (Guy's) Dr. Wilks records that "he has never seen but one case of intussusception *in an adult*, and in this case the obstruction was never complete, and death did not occur for some weeks."* In the Transactions of the Pathological Society of London, extending over the first fifteen years of its existence, there are only seven cases of intussusception *in the adult* on record—no two of which occur in the individual experience of any one man. The ages of these seven cases are respectively as follows:—namely, 18, 25, 32, 34, 41, and two at 44 years. In one case the symptoms continued for three months, and at last ended in recovery after the passage of a portion of ileum (*containing a polypoid tumour*) by the rectum.† In another case the symptoms continued during four months and terminated fatally by exhaustion. In my own experience I have never made a *post-mortem* examination of a case of intussusception *in an adult*, nor have I ever seen a case of intussusception *in an adult* during life. In the Museum of the Army Medical Department at Netley there are preparations showing the lesions and morbid relations of the parts preserved, from at least eight cases occurring in soldiers at ages varying from 20 to 42 years of age.

* Pathological Anatomy, p. 292.

† Peacock, Path. Soc. Trans., vol. xv., p. 114.

II. The case recorded by Dr. Todd is of great interest, inasmuch as the dissection of the parts made at Netley shows that the intussusception was associated with a large polypus growing from the mucous surface of the small intestine. The history of the case further shows that it was preceded and accompanied by intense and severe diarrhœa; and in the course of examination of the parts sent to Netley, my coadjutor, Dr. Davidson, discovered that the mucous membrane of the *caput cæcum* was infested by the minute parasite known as the *trichocephalus dispar*. This parasite is a very minute round worm, with its head-end of hair-like fineness, usually firmly fixed to the mucous membrane of the intestines, while the rest of the body is generally coiled upon itself and hidden amongst the mucous secretion of the gut. The natural history of this entozoon shows that it has oftentimes been associated with severe epidemics of diarrhœa. Indeed, its discovery more than 100 years ago (1760-61) was made during the prevalence of a severe epidemic of diarrhœa (*morbus mucosus*) amongst the soldiers of the French army, associated with the presence of this parasite in the *caput cæcum* of those who died of the disease.

The parasites in the case of intussusception now under consideration were coiled up amongst an abundant white secretion, and amongst small hardened portions of fæces which were impacted in the folds of the *caput cæcum*.

Long-continued sources of irritation are thus shown to have existed in this patient both above and below the ileo-colic valve, through which the small intestine passed to form the intussusception; and doubtless to such sources of irritation the proximate cause of the affection is to be ascribed. The occurrence of polypoid tumours of the intestine, associated with an intussusception, is of still more rare occurrence as a source of irritation than other circumstances which may bring about this affection. *Only five cases of intussusception are recorded in the Transactions of the Pathological Society which are associated with polypoid tumours of the intestine at or near the site of lesion.** The latter case referred to in these Transactions terminated favourably after the passage of the invaginated portion of gut (containing the polypus); the symptoms having continued for three months.

One of the specimens of intussusception preserved in the Museum of the Army Medical Department is also associated with an epitheliomatous polypoid tumour (numbered $\frac{1228}{\text{Appendix 114}}$ in the Catalogue).

III. The case related by Dr. Todd is one of great interest from the practical lessons which it teaches, especially when compared with the records of similar cases. The symptoms and phenomena of the case are as typical of intussusception as they ever are; and when such phenomena occur they are sufficient to justify the conclusion that the case is one of invagination of the gut, a simple incarceration, rather than obstruction of the bowel, or internal strangulation, such as that which happens when the bowel gets twisted round a band of lymphy peritoneal adhesions, causing a stricture with complete obstruction, like what takes place in a strangulated hernia. In cases of complete strangulation of the gut by such strictures the symptoms are sudden, and if the stricture be not relieved the case proves speedily fatal.

On the other hand, in cases of intussusception the symptoms of the incarceration are by no means sudden nor rapid in their progress; or, rather, they are comparatively slower in their development and progress to a fatal issue than cases of complete obstruction by strangulation are.

In cases of intussusception the impediment from the first is partial, and in some cases the obstruction is never complete, although the symptoms may extend over many days, or weeks, or even months. One case is on record in the Transactions of the Pathological Society in which the symptoms of incarceration were present during four months, and although adhesions had formed between the serous coats of the invagination, yet obstruction of the intestinal canal was never complete.†

A summary of the prominent phenomena in the case recorded by Dr. Todd may be stated as follows, showing the comparative slowness and incompleteness of the obstruction, as well as bringing forward those phenomena which (when

* Vol. i., pp. 95–97; vol. xiv., p. 173; and vol. xv., p. 114.

† Dr. Hare, vol. vii., p. 193.

weighed with other symptoms) may be regarded as pathognomonic of intussusception. On the authority of Dr. Todd's examination, it is to be observed that the hæmorrhoids from which the soldier suffered in 1857 had nothing to do with the symptoms of intussusception which proved fatal. Diarrhœa early in July, 1865, is the first indication of illness, and it is reported to have been prevalent at the time amongst the troops at the station. In connection with this diarrhœa and its prevalence, the existence of the parasites in the *caput cœcum* must not be overlooked, inasmuch as their existence in one man renders it probable that they may have existed also in others as a cause of the prevalence of such diarrhœa in an epidemic form.

On the 14th of July the patient is admitted into hospital collapsed and suffering from nausea and diarrhœa.

The following day he has tenesmus—a feeling of fulness in the rectum; and after going two or three times to stool during the night, he is observed *to pass blood only.*

On the 16th some pale but consistent feculent matter is passed, and *a similar discharge of blood.*

On the 17th an enormous discharge of fæces takes place after an enema, but again accompanied by *a large flow of blood.*

On the 18th, 19th, and 20th of July *he continued to pass blood at stool*; and on two occasions scybala. Small portions of hardened fæces were continued to be got rid of, but every effort was attended by *the usual flow of blood.* Purgative remedies obviously aggravated the symptoms; and on the 23rd July, after a dose of castor-oil and turpentine, vomiting set in.

On the 25th the patient died comatose, the coma most probably having been due to the comparatively sudden and extensive subarachnoid effusion which the *post-mortem* examination showed within the cranium. Death was thus comparatively slow; and hence the extensive coagula also found in the cavities of the heart. No signs of inflammation of the serous coats of the involved intestine are to be seen in the parts sent to Netley, and the canal of the bowel is pervious. The affection is shown not to have progressed rapidly, and the soldier lived eleven days after symptoms of intussusception set in.

The parts of the large and small intestine which composed the intussusception were received at Netley in an excellent state of preservation. They consisted of the *caput cœcum*, and a considerable portion of the small intestine with their mesenteric connections. The cæcum had been divided upwards towards the ileo-colic valve, just sufficient to expose an invaginated portion of the small intestine, which having slipped through the valve had thus been swallowed up as it were by the caput cæcum. To investigate the nature of the lesion more completely, the containing bowel was opened up to the reflected part at the valve. This incision exposed the *mucous* surface of the included bowel covered with a white creamy exudation, and greatly corrugated by the dragging of its mesentery in the serous pouch of peritoneum which forms a *cul de sac* between the included and including parts. The sacculi of the caput cæcum were now fully exposed, and numerous hard scybala lay impacted amongst the folds of the mucous membrane, imbedded in a leucorrhœal-like secretion, amongst which the coils of numerous parasites (*trichocephalus dispar*) were to be seen, many of which were washed away in cleaning the preparation.

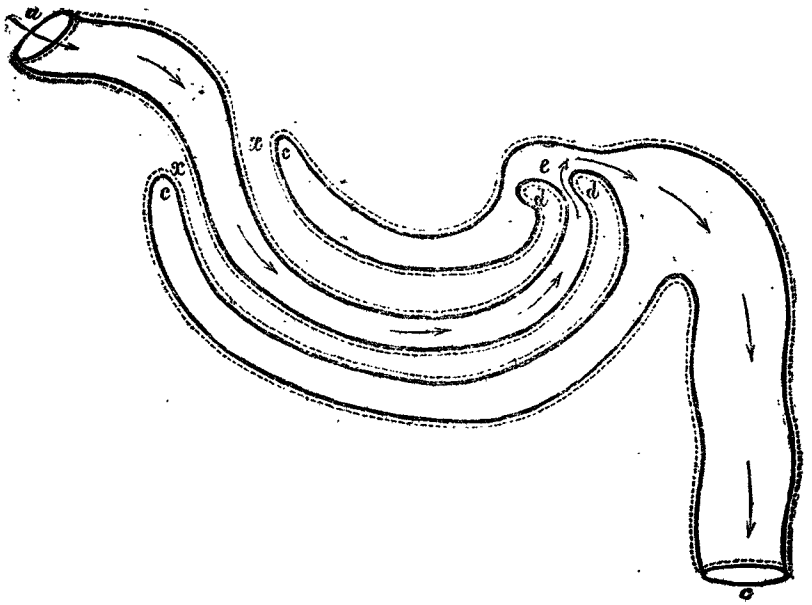
The *appendix cœci* was free and normal, not having been included in the lesion. The portion of ileum which had passed into the cæcum measured about ten inches, so that the whole invagination measured about five inches in extent, and had the usual curved appearance of an intussuscepted gut, as it lay exposed in the cavity of the great intestine. At the reflection of its exposed mucous surface (*i.e.*, at the distal end of the invagination), a large round mass was seen to protrude (of about the same diameter as the gut). This mass was found to be the termination of a periform polypoid tumour, attached by a narrow neck to the mucous surface of the intestine. It grew from the substance of the gut, having its site about six inches from the valve. It measured two inches in extent by about an inch and a half thick. The appearance of the lesion, and the relation of the parts, may be better understood by a reference to the accompanying most excellent drawings made from nature by Staff Assistant-Surgeon Dr. Humphrey D. Gillespie.

In the drawing *A*, the letters indicate the following parts :—(*a*) peritoneal c t of ileum; (*b*) the cut-edge of the caput cæcum; (*c*) appendix vermiformis cæci; (*d*) mucous surface of the ileum at the part invaginated; (*e*) mucous surface by the cæcum; (*f*) polypus attached by a narrow neck to the mucous surface of the ileum; (*g*) cut-edges of the small intestine.

The appearance of the tumour on section is shown in Drawing B.

In order that the relations of the parts may be more clearly comprehended, Dr. Gillespie has also made a theoretical or diagramatic representation of the parts with the tumour attached and turned upwards; as shown in Drawing C. The letters indicate the same parts as given in A.

As it is not always easy to follow the anatomical relations of the several layers of structures composing an intussusception, it may be of use to give here a still more diagramatic outline of the relation of the serous and mucous coats of the intestine in such lesions, because it is of practical importance to remember that although the parts are greatly displaced in such cases, yet the anatomical relations of the serous and mucous surfaces of the intestine are never altered. Textures of the same anatomical character are always in contact one with another, and the channel of the gut along its mucous surface is always open. That such is the case may be understood by taking the leg of along stocking from which the toe-end has been cut-off, so that the stocking may be thus converted into a continuous tube open at both ends. If one portion of the stocking be then drawn into the other a correct imitation of the relation of surfaces in an *intussusception* will be obtained.



In the diagram the tube *a*, *b*, may be traced to be continuous as indicated by the arrows. The dotted line is meant to correspond to the *serous* surface, and the thick dark line to represents the *mucous* surface of an intestine comprehending an *intussusception*. From the outer to the *innermost* surface at the site of lesion, on cutting through one layer, *the first* of the enclosing gut, a MUCOUS SURFACE is reached, which has a *cul de sac* reflection at *c*. Thus, the MUCOUS surfaces of the including and the included portions of intestine are in constant apposition, rubbing against each other. On cutting through the *second* layer of the *intussusception* a SEROUS SURFACE is reached which has a *cul de sac* reflection at *d*. Thus, the SEROUS surfaces of the including and the included portions of intestine are in constant apposition, rubbing against each other. At *e* the mucous canal is always more or less open in cases of simple

Day & Son, lithographers to the Queen.

A Appearance of the lesion in Dr Todd's Case of intussusception, & the relations of the parts.

(See Page 532 of Report for 1864.)

Day & Son Limited) Lith.

B. Appearance of the Polypoid Tumour on section in Dr Todd's case of intussusception.

(See Page 532 of Report for 1864.)

Day & Son, Limited) lith.

C. Theoretical Section: shewing the invaginated intestine with the Tumour attached to its interior mucous surface

(See Page 532 of Report for 1864)

intussusception; but the orifice is invariably turned to one side, and may be so firmly applied against the mucous surface of the including intestine (by the dragging of the mesentery which has been included) that the orifice may be closed, like a valve, by simple apposition and compression. In consequence of the lateral attachment of the mesentery to a line along the serous surface of the intestine, a portion of mesentery equivalent to the extent of the serous surfaces in apposition is also dragged into the containing gut, and exercises a most important influence upon the nature of the lesions. In consequence of the one-sided attachment of the mesentery, and the dragging of its parts, the included gut necessarily takes the form of a curve. It thus appears highly corrugated over its mucous surface, dragged to one side and curved upon itself as it lies exposed on cutting up the outermost layer of intestine. The orifice of the contained or invaginated intestine is thus turned upwards, and is not to be found at what appears to be the lowermost part of the extreme end of the included portion of bowel. This great dragging of the mesentery necessarily also obstructs the mesenteric vessels and leads to the gradual effusion of blood between its layers. This effusion is seen after death in the form of compact indurated masses of a dark colour. Blood is also gradually effused from the mucous surface of the gut, which becomes gradually strangulated; and, combined with other symptoms, this persistent effusion of blood is almost pathognomonic of incarceration of a bowel in the form of intussusception.

In some cases the pressure of the inclosed bowel on the containing gut, and the dragging of the included mesentery is so intense, that the invaginated portion has actually effected an opening by ulceration through the enclosing bowel, and so projected into the cavity of the peritoneum before death took place. In such cases the fatal result was generally by peritonitis. Four specimens in the Museum of the Department illustrate this fact in the pathology of intussusception. One numbered $\frac{1238}{1130}$ has no history; another marked $\frac{1240}{1132}$ is quoted as an example of the bad effects of purgation; the third numbered $\frac{1225}{1119}$ is from a woman aged 24, she had been ill ten days, when an extensive opening occurred through the enclosing bowel, and peritonitis of a severe form speedily proved fatal. A fourth $\frac{1240}{1131}$ in a soldier aged 22 will be referred to afterwards.

The practical importance of Dr. Todd's case is still further shown by the forcible corroboration it gives to the opinion that in all cases of intussusception, whether occurring in children or in adults, the administration of purgative medicines tends to aggravate the lesion and the symptoms. Accordingly the rule of practice is absolute;—namely, "to withhold all purgative medicines from the commencement in cases of intussusception." The bowel being incarcerated, the stimulus of purgation proceeding from above downwards is quite unable to undo the incarceration of an intussusception. A purgative, therefore, acts injuriously as a stimulus which cannot be obeyed; and the obvious tendency of a purgative is to increase the peristaltic action of the bowels, and therefore to increase still more the invagination. That such is the case will be readily understood by a physiological consideration of the phenomena of intussusception; for although it is not always easy to account for the first beginning of an invagination, yet physiology enables us to understand how an invagination once begun the lesion tends to increase:—(1) From the peristaltic action of the bowel, greatly stimulated and increased by irritation of every kind, so long as tonic irritability continues; (2) from the spasmodic action of the part of the gut *above* the invagination preventing spontaneous return; (3) from the invagination being thus completed it continues permanent, tenesmus occurs, and thus the violent and repeated contractions of the abdominal muscles tend still more to maintain and increase the lesion. The constant motion and pressure of parts one upon another in some cases is so great, that the end of the invagination has been known to penetrate through the walls of the enclosing bowel, so as to appear in the cavity of the peritoneum. Three specimens in the Museum of the Army Medical Department at Netley in illustration of this have been already noticed; and there is one specimen of intussusception $\frac{1239}{1131}$ (from a soldier aged 22) in which a very large mass of gut is involved, and which is very significant of the injurious influence of purgation

in such cases. Although this soldier is recorded to have had persistent diarrhœa, flatulence, bloody stools, and other symptoms of intussusception, he was nevertheless alleged to be a malingerer. He was treated with purgatives, and lived long enough for the end of the included gut to wear a hole, by pressure and rubbing, through the substance of the containing bowel. No one can doubt but that such a lesion would be greatly aggravated by purgative remedies.

The injurious tendency of purgative medicines will be also still more apparent if a lesson is taken from the teachings of morbid anatomy. *Post-mortem* examination combined with a study of the phenomena of intussusception during life, shows that the increase of the lesion takes place mainly at the expense of the *external containing* portion of the bowel; and therefore, also, it can readily be understood how some fixed point in the bowel is the first starting-point of an invagination. Most frequently it is the ileum which passes into the colon, then the colon passes into itself, so that the *appendix vermiformis cæci* becomes included. Two orifices then exist at the extreme end of the invagination:—one is that of the bowel, the other is the entrance into the *appendix cæci*. Two preparations in the Museum of the Army Medical Department shows this arrangement of the parts composing the lesion in cases of invagination.

Causes.—In all the dissections of invagination whose history I have examined, they have either been associated with the diarrhœa of irritation (as from worms, undigested masses of food); or with cerebral lesions (as in the cases of children in whom invaginations are very common); or with ulcers of the intestines, or polypoid growths as in this case.

In the fifteenth volume of the Transactions of the Pathological Society of London, Dr. Peacock gives an account of the passage of a large piece of bowel by the rectum in a case of invagination, followed by recovery; and in that paper he refers to eighty-eight cases of intussusception in which portions of bowel are reported to have passed by the rectum.

In giving a summary of these cases Dr. Peacock finds that, while in some cases no cause could be assigned for the affection, in others the disease appeared to have been excited by accidents, taking injudiciously large meals or improper food, by the irritation of drastic purgatives, the presence of worms, &c." In the cases which he has analyzed, "in one instance the disease followed a kick, in another the carrying of a heavy weight, and in a third the taking of a large meal; in one an active purgative had been taken a few days previously, and in one there were worms in the bowels." In the case he particularly records to the Society, "the predisposing cause might possibly be the small polypus which was found attached to the mucous membrane, near what appeared to be the upper end of the invaginated portion."*

As to how the lesion first commences some notion may be obtained, and the physiology of the process may, to some extent, be comprehended by experiments on the intestines of animals while under chloroform, or just after having been killed. If a portion of the small intestine be pinched with a pair of forceps, active circular contraction and constriction of the gut immediately commences at the site of irritation. This constriction continues for some time, and is transmitted, or advances onwards, under the influence of the usual peristaltic action of the intestines. Wave upon wave of constrictions may be made in this way to follow each other in succession, so long as the vital irritability of the intestine continues. If the advance of the constriction onwards is impeded by any cause, such for instance as an undigested mass of food, a scybalous portion of fæces, a foreign body, or a polypoid growth, or even another constriction, and if the onward motion of the bowel fails to dislodge the obstruction, a partial invagination very readily occurs; but where the obstruction is necessarily localized (as from ulcers, polypoid growths, or fixed parasites) permanent invagination commencing in the vicinity of such local lesions is more readily induced. The mere weight of a polypoid growth, like the one in the case related here, would necessarily favour the occurrence of invagination; and situated only a few (six) inches above the ileo-colic valve, having made its way through the valve, the spasmodic contraction of the valve would effectually prevent the spontaneous return of the invagination.

The cases of most serious import are those which, commencing in the small intestine, involve the ileo-colic valve; and the majority of fatal cases are those in which (as in this case) the cæcum and ascending colon has swallowed up, as it were, a large portion of the small intestine; and the danger may not be at first appreciated, because the obstruction is never complete in the first instance, as we know from the nature of the lesion as well as from the accurate history of cases. The bowel, at first, is merely incarcerated by the invagination, and it is not until the middle and internal portions, with their contained mesentery, become compressed, constricted and ultimately strangulated, that complete obstruction ensues. Inflammation and sloughing thus commence as the parts become subjected to more and more increasing pressure.

Two forms of inflammation prevail, namely, one—serous—between the opposed peritoneal surfaces, and commencing at the angle of reflection (*x*, *x*, *x*, in the Diagram 532) of the middle on the external layer, at the part where the one portion slips into the other. It is here that the peritoneal surfaces of the invagination commence to adhere; and up to this period of the affection the ancient remedy inculcated by Hippocrates, of injecting air into the great gut by a long tube, introduced *per rectum*, has effected the greatest number of cures—forcing, by gentle, persistent, and equal pressure, the invagination backwards and so causing it to be undone. The other form of inflammation takes place between the two opposed mucous surfaces (*c*, *c*, in the Diagram). At this angle of reflection an abundant white leucorrhœal-like secretion commences very early to be discharged by the rubbing of the opposed surfaces, and eventually the inflammation (mucous and serous) may be so destructive that ulceration and sloughing of the whole invagination may be the consequence. In this way continuity of the canal may be restored—the invagination having passed, *per rectum*, as a slough. Of such cases eighty-eight are now on record, an analysis of which, by Dr. Peacock, has been already referred to.*

Another efficient and increasing cause of obstruction exists in the included mesentery. By its inclusion it causes such a drag upon the included portion of bowel, that the mucous surface of the bowel is not only greatly corrugated, but by apposition against the containing bowel the narrow canal through the invagination becomes completely closed. The anatomy of the parts at once shows how this is effected, for the mesentery being attached only to one side of the gut, it drags the intestine to that side; and the greater the amount of bowel invaginated, the greater will be the curvature of the included portion upon the mesentery as an axis; and the greater and earlier will be the complete obstruction.

Thus, when a case of intussusception is examined after death, the invaginated portion of bowel is always seen in the form of a curve lying within the including intestine; and thus the extreme end of the invaginated portion comes to be so turned upon itself that the canal by apposition is completely shut up. The blood-vessels of the impacted mesentery thus also undergo great and increasing congestion; and as strangulation and obstruction become complete, indurated masses of blood may be found effused within the folds of the mesentery; and as this strangulation increases blood exudes from the mucous surface of the intestine, so that small flocculi of blood, as well as fluid blood mixed with mucus and free from fæcal matter, continue to pass *per rectum* as long as the canal remains open, and such symptoms (hæmorrhoids excluded) are justly regarded as pathognomonic of incarceration of the bowel from an intussusception.

CASE OF STRICTURE OF THE RECTUM.

By T. Goldie Scot, M.D., Surgeon-Major, 79th Cameron Highlanders, Nowshera.

Serjeant S., age 26 years; service 6 years; of a strumous diathesis, fair complexion, spare habit of body, and looked older than twenty-six.

* Path. Soc. Trans., vol. xv., p. 114.

In the beginning of 1861, he first detected a small hard growth at the verge of the anus; began to observe that he voided his fœces with an effort, and that they were flattened and diminished in calibre. In November, 1861, he thought he was labouring under an attack of piles, and applied for advice, On examination, a condylomatous-looking tumor, about the size of a horsebean, was detected at the margin of the anus, and close to it a small hœmorrhoid. In the December following, he began to experience lancinating pain in the region of the rectum and anus, and perceived that there was a slight purulent discharge from the surface of the growth. From that date he became a frequent applicant at hospital, seeking relief from the annoyance caused by the recurrence of the ulceration, the continuance of the lancinating pain, and the difficulty of properly evacuating the bowels. On the 7th February, 1862, he was admitted into hospital. The condylomatous-looking growth had much increased in size and hardness; its surface was fissured and ulcerated. On trying to introduce the finger *per anum*, the diameter of the passage was found to be diminished, the progress upwards of the finger was impeded by the diseased condition of the gut, the entire circumference of which, internally, was unyielding, rough, and studded with growth similar to the external one. The lightest pressure caused excruciating pain. On the 15th of March, the canal of the rectum was constricted so as barely to admit the forefinger, and about three inches from the external orifice an annular constriction was met with, into which only the point of the finger could be inserted. In the beginning of April, a fistulus opening was discovered, its course as indicated by a probe, following the median line, but from the impossibility of getting the finger through the stricture, it could not be determined whether or not the fistula communicated with the gut. It was proposed to lay open the fistula, and at the same time divide the stricture, but, at the urgent request of the patient, any operative measures were postponed. On the 23rd of May, having rejoined from leave of absence and resumed charge of the regiment, I, in conjunction with Staff-Surgeon J. Hendley, and Assistant-Surgeon P. Kilgour, 79th Cameron Highlanders, made a thorough examination of the diseased parts. To do so effectually, and, at the same time, save the patient from much suffering, he was put under the influence of chloroform. Encircling the orifice of the anus were found several firm, tough, unyielding excrescences, presenting ulcerated points, from which oozed an ichorous discharge. The integument round the anus and the subjacent tissues were hard and knotty, and the glands in the groins were similarly affected. Great resistance was encountered to the passing of the finger through the sphincter and beyond it, the gut was much contracted, the walls hard, nodulated, and unyielding. At about 2½ or 3 inches above the sphincter, the progress of the finger was completely arrested by the narrowness of the passage, the point grasped in a firm stricture. Before withdrawing the finger, I endeavoured to ascertain, with a probe, if the fistula communicated with the gut, but up to the point of stricture it did not. The stricture would not admit of the passage of an instrument larger than a No. 8 catheter. A constant and considerable flow of blood occurred during the examination, and the patient, though fully under the influence of chloroform, winced and groaned much, and was in much pain for several hours after consciousness returned. The examination satisfied us that not only a very formidable stricture of the rectum existed, but also that the gut and neighbouring tissues were the seat of cancerous disease. The feasibility or propriety of attempting any operation, such as division of the stricture, was, beyond doubt, negatived. Considering how far the disease had advanced, his general health was wonderfully good, and his sufferings, when the diseased parts were not interfered with, were by no means so distressing as might have been expected. It was decided merely to watch the progress of the case, to relieve pain by opiates, to maintain as far as possible his general health, and to relinquish all attempts at dilating the passage by means of bougies, as they only excited irritation, bleeding, and intense pain.

Month by month, week by week, the diameter of the passage, through the strictured portion of the gut, became less and less; small abscesses formed in the perineal space, one of which opened into and discharged its contents by the urethra. The pain and discharge characteristic of malignant degeneration continued; it became evident that ere long complete obstruction of the gut,

would take place, as only watery evacuations were, after protracted efforts, forced through the stricture. The patient became anxious and much alarmed, daily beseeching that some operation should be performed. Such was the state of matters on the 12th September, when the usual laxatives failed to give relief. A full dose of castor oil was administered, and repeated on the 13th. On the 14th, he became very much alarmed, as he had not (even with the aid of the oil) for three days passed even fluid matter. Endeavours were in vain made to throw up enemata by means of the smallest tubes. In continuing the history of this interesting case, I cannot do better than give a copy of some of the daily reports entered in the hospital case book.

September 17th.—"There is considerable distention of the abdomen and well marked tympanitis; blue veins are seen in every direction. The bowels have not been moved since last report. The patient is urgent that no further delay in operating on him should take place. As a *dernier ressort* in the way of medicine, a dose of croton oil to be given in the hope that, by making the contents of the bowels more fluid, and inducing powerful action, fœcal matter might be forced through the stricture.

Vespere.—"Throughout the day there has been strong intestinal action, with a constant rumbling sound, but neither fœces nor flatus have passed by the rectum; much flatus passed by the mouth, and nausea is complained of.

18th.—"Nothing has been passed. The man's sufferings are increasing, and, with them, his anxiety. The abdominal walls are tense. It is now evident that if the bowels are not relieved in some way or other, death must soon take place from one of three causes; viz., by rupture of the gut, peritonitis, or exhaustion from constant suffering and anxiety.

Vespere.—"No improvement. To take two grains of morphia.

19th.—"He slept during the greater part of the night, but in an uneasy way. The morphia has lulled the pain, but he is still very nervous and alarmed. Distention of the abdomen is increasing.

Vespere.—"Operative interference of some kind cannot, in justice to the patient, be delayed much longer. What operation most commends itself? It is clear that to cut through the stricture is out of the question. Of those given in books, that of Amussat, for the formation of an artificial anus, holds out the best prospect of giving permanent relief. In consultation with Assistant-Surgeon P. C. Baxter, 93rd Sutherland Highlanders, doing duty with the 79th Regiment, it is decided that, in the event of no improvement in the condition of the patient taking place, the above operation shall be performed to-morrow at daylight. The opiate to be repeated.

20th.—"The patient passed a restless night; vomited several times; tenderness over the abdomen setting in; no passage by the bowel. Pulse 120, wiry; countenance anxious and haggard.

"The nature of the proposed operation, its risk, and the life of discomfort he must look forward to, even after the most successful result, were fully explained to the patient, and he unhesitatingly implored that it should be performed. At 6 a.m., having placed the patient on a table in the verandah, he was brought fully under the influence of chloroform. He was turned on his right side, and the operation commenced by making an incision, 4½ inches in length, in the space between the last rib and crest of the ilium, on left side. The incision, began at about an inch and a half from the spine, was continued in the direction of the superior spinous process of the ilium. The muscles were cautiously cut down upon and divided *seriatim*, until the lumbar fascia was reached; up to this stage only one small artery was divided, the hæmorrhage from which was arrested by torsion. The lumbar fascia was next cut through and the opening enlarged on a director. The intestines were exposed to view, and having ascertained that the presenting gut was the colon, two threads, by means of a curved needle, were passed into and out of it; the threads were drawn outwards, and by them the bowel was retained at the margin of the incision. A transverse opening, one inch long, was then made in the posterior surface of the gut, the edges of the upper and lower portions brought into perfect apposition with the skin, by four silver wire sutures. The ends of the incision through the skin were closed by wire sutures, and concluded the operation. The contents of the bowels continued to pour forth in an almost continous stream for two hours. On regaining consciousness, the patient ex-

pressed joy at the relief which had been afforded him. The difficulty in breathing, the pain and tension of the abdomen, were gone, the pulse became more tranquil. As soon as the flow of the pent-up matters had abated, a large flexible bougie was introduced through the artificial opening, and passed upwards and downwards, in order to break up any solid fæculent matter. Dr. Baxter's assistance throughout the operation was able and very valuable.

Vespere.—"He says he is a different man; has enjoyed refreshing sleep; has no pain in the abdomen, nor in the site of the operation. The bowels evacuating freely through the artificial anus. Has not passed any urine, and cannot. A catheter introduced passed into a false passage, probably the one through which the discharge of pus has been of late escaping. After withdrawing the catheter, the urine flowed.

21*st.*—"He passed a good night; early this morning had a slight paroxysm of the periodic fever now prevalent.

"Quinine to be given three times a day. Diet, bread and milk.

22*nd.*—"He has passed another good night; pulse 84, soft. Bowels evacuating freely; no pain, no tenderness.

23*rd.*—"The periodic fever has passed off. He is now looking very well, is free from pain, excepting occasional shooting pains in the rectum and thereabouts.

"The incision is looking healthy. One of the external sutures has separated. Adhesion of the gut to the deeper tissues has taken place, but not as yet to the skin.

24*th.*—"The other superficial suture has separated. The gut is becoming joined to the skin.

"Everything looking well. The circumference of the opening is padded with charpie, sufficient opening left for the passage of the alvine discharges, which are beginning to come away, not continuously but at intervals. Much care is taking to keep the parts clean. Appetite good. Diet—chicken, with bread and milk, *ad libitum*. The sutures, intended to keep the gut in apposition with skin, came away on the 5th and 8th days.

October 2*nd.*—"This is the 12th day since the performance of the operation. Everything has gone on well. The incision is clean and healthy; nature is gradually and perfectly closing the opening, embracing the gut so as to protect it, and at the same time prevent the possibility of any discharge getting into the abdomen; the discharges now come away at pretty regular intervals. Prolapse of the gut takes place, but is easily reduced; the prolapsed portion does not become irritated by being in contact with the bedding.

November 1*st.*—"The entire circumference of the opening in the gut has become perfectly joined to the muscular tissues and skin; the edge of the gut plaited so as to make the opening circular and at times to have, in a slight degree, the action of a sphincter.

15*th.*—"Though, as far as regards the result of the operation, success has been attained, there is no hope of the patient's life being prolonged beyond a very short time, as the cancer is gradually extending, embracing now the prostate and bladder, and extending even to the lungs and other viscera. The lancinating pain has returned, and he is becoming much emaciated. He can move about without any inconvenience; but unfortunately is unable to sit, on account of the tenderness of the diseased rectum and external growths.

December 26*th.*—"The progress of the cancer is daily more marked outwardly and inwardly; it is spreading—involving the pelvic and thoracic viscera.

"The urine is highly ammoniacal, loaded with phosphates, and floating in it are shreds, no doubt the débris of the tissues involved in the disease. The disease is also gradually extending up the gut; as, mixed with the secretions, which pass out at the artificial outlet, are discharges similar in character to that given off by the external cancer. He does not now suffer so much from the lancinating pains; complains more of a difficulty in breathing and harassing cough, doubtless effusion into the cavity of the chest is gradually taking place. He is utterly wasted away, and far spent. Death put an end to his sufferings on the 12th January, 1863; his life, however, had been prolonged by means of the operation for nearly four months."

In surgical works it will be found that some of the highest authorities

condemn the operation for artificial anus; arguing that the state of the patient after the operation is worse than before it; that death itself is preferable to the wretched existence to be dragged out. Doubtless the discomforts and disagreeables are revolting to contemplate, but with certain death as the only alternative, who would not willingly encounter them. Had not the disease, which led to the occlusion of the gut, been of a malignant character, the operation would have prolonged Serjeant S.'s life indefinitely; as it was, he had four precious months added to it, enough, surely, to justify the performance of the operation under similar circumstances.

Sectio Cadaveris—24 hours after death.

Thorax.—About 40 ounces of a cherry-coloured serum were found in the right pleural cavity; the lung bound down by firm adhesions, and reduced in bulk to about one-third of its natural size. The surface of this lung was covered with layers of false membrane; its tissue compressed and carnified, and scattered throughout the parenchyma were soft cancerous nodules about the size of millet seeds, the nodules most numerous at the apex of the lung. The intercostal pleura on this side, as well as on the left, was covered with cancerous nodules very much resembling the eruption of small-pox. The upper surface of the diaphragm presented a similar appearance. The left lung was not so much diseased as the right one. *Heart.*—Small, muscular substance of a pale colour. *Abdomen.*—The whole of the peritoneum, omental and visceral, was thickly studded with cancerous nodules, of the size of a pea, of a whitish colour and soft consistence. The great omentum showed this appearance in a marked manner; and, towards its lower border, the nodules became more numerous and firmer in consistence. The omentum and its margin was converted into a thick, firm, cancerous mass, and adhered firmly to the symphysis pubis. The mesentery was thickly studded with little masses about the size of pepper-corns. The liver was adherent to the diaphragm, slightly enlarged; its substance full of cancerous deposit. *Intestines.*—The lining membrane of the small intestines showed signs of congestion throughout; they, together with the large gut, were removed, terminating the dissections at the left extremity of the transverse colon, at which point the gut was tied. The descending colon was left *in situ*; a rectum bougie was passed through the artificial anus upwards, without meeting with any obstruction; but, on turning it downwards, its progress was arrested a very few inches from the orifice, not as was afterwards ascertained by the stricture in the gut, but by an accumulation of fæculent matter, which had evidently been collected there for some time, and by its weight had become compressed.

The whole of the descending colon, the rectum, and bladder were taken out *en masse*, including, in the dissection, several inches of the abdominal wall, where it surrounded the artificial anus.

To do all this more effectually, both symphyses of the pubes were sawn through, and the intermediate portion of bone removed, and the schirrous growth round the anus was included in the dissection. After removal, the gut was laid open until reaching the stricture, which, at its upper end, was considerably wider than its centre or lower end. The passage admitted, but would not allow to pass through it, a No. 8 catheter. A silver probe has passed through the entire length of stricture with difficulty. The stricture was four inches in length, and the artificial anus was thirty-one inches distant from the natural one. The schirrous mass, on the right side of the anus, penetrated into the pelvis, implicating the bladder, and, binding together the other viscera within that cavity, was also continous with the cancerous mass over the symphysis pubis. The head was not examined. A preparation, consisting of the diseased mass, and site of operation, was sent to the Museum at Netley Hospital; but, unfortunately, on arrival there after a protracted voyage round the Cape, it was found to be completely decomposed.

SEVEN CASES OF STRICTURE OF THE URETHRA,

TREATED IN THE HOSPITAL OF THE 4TH DEPOT BATTALION, BY MEANS OF "HOLT'S DILATOR."

By Staff Assistant-Surgeon C. HERVÉ GIRAUD.

Of the accompanying seven cases of stricture treated by means of Holt's Dilator, very little can be said in the way of remark upon them; the abstract given showing that they all terminated quickly and satisfactorily, and that in no case was there any unfavourable symptom after the use of the instrument. In Cases 1 and 2, the rapidity with which the fistula closed after the operation, appears worthy of notice, especially in Case 1, where it had centred for several years. I should state here that these two patients were under the care of, and operated upon by Staff Surgeon Skeen.

Chloroform was not given to any of the men, and the pain at the time did not appear to be very great, nor was it lasting. Slight scalding on passing water, followed by a drop or two of blood, being the only after effect in nearly all the cases. In Case 3 there was rather more bleeding, on account of the tender state of the urethra.

I found that the dilator passed much more readily than might be supposed from the smallness of the curve; the only thing that rendered the use of it at all difficult being the sharpness of the end, arising from the fact that the opening is situated there, and an edge is thus presented to any obstacle in passing of the instrument.

The small tube in the dilator, used for the above cases, was stopped, and therefore useless; but as any one accustomed to use a catheter can hardly be mistaken about its having entered the bladder, and as the only use of a perforated guiding wire is to ascertain that fact, I think the instrument would be safer and better with a solid one; the end in that case being rounded like an ordinary bougie. Even if the tube as it now stands should be thought necessary, a couple of small holes in the side close to the point would, I think, answer the purpose.

Case 1.—Private J. S., 98th Regiment, was admitted to hospital on the 13th of February, 1866. He was then suffering from a permanent stricture in the membranous portion of the urethra, of very long standing. There were also two fistulous openings, situated at the junction of the scrotum and the perineum, through which the urine passed. The stricture, a very close and hard one, in front of the two openings before mentioned, was, after a while, dilated by means of the ordinary catheters, until a No. 9 could be passed; in the hope that with proper treatment and attention to the drawing off of the water a cure might be effected. No improvement, however, was observable, and the stricture very quickly closed again, when the use of the catheter was abandoned. It was then determined that "Holt's Dilator" should be tried before any other steps for the cure of the fistula were taken. The instrument was accordingly introduced, and the stricture split. A No. 10 catheter being introduced when it was withdrawn. Ten grains of quinine, with a full dose of tincture of opium, were given after the operation. This man deserted on the 3rd of April, before the completion of the case; but the stricture was completely cured at the time, and the water had almost ceased to pass through the openings, and I have no doubt that in a few days more they also would have been quite well.

Case 2.—Private P. T., 98th Regiment, was admitted into hospital on the 5th of March, 1866. A case of permanent stricture of long standing, and situated about the middle of the membranous portion of the urethra. The water came away drop by drop, and it was for some days found to be quite impossible to pass an instrument. This was at last accomplished, and the stricture dilated until a No. 9 could be used. At this period of the treatment he began to complain of severe pain between the legs, and some external hardness could be felt. Pus next began to pass by the urethra in considerable

quantities. This ceased after a day or two, and the hardness in the perineum began to increase. The scrotum also became so much distended from infiltration of semen as to lead for a time to the belief that extravasation of urine had taken place; and this belief was strengthened by the fact that the passage of the urethra had again become obstructed. The distension subsided in about three days, and it was then evident that there was a collection of matter in the perineum. The abscess was opened, and several ounces of pus, tinged with blood, escaped, followed, on the first attempt to micturate, by urine. This second abscess must, therefore, without doubt, have been connected with the one which some days previously had burst into the urethra, and a "perineal fistula" was thus established. After a few days rest and good diet with malt liquor, and when matter had almost ceased to run from the opening in the perineum, the stricture was dilated again sufficiently to allow of "Holt's Dilator" being passed. This was accordingly done, and a No. 10 catheter immediately after it. A dose of ten grains of quinine, with half a drachm of tincture of opium, was then given. The No. 10 catheter was passed on every alternate day after the operation. On the 10th of April he was discharged, both stricture and fistula being perfectly cured, and the water passing in a large and natural stream.

Case 3.—Private J. H., 82nd Regiment. Admitted 7th March, 1866. A stout, strong-looking man, in good health, with the exception of the complaint for which he was taken into hospital, viz., permanent stricture of the urethra, situated at the anterior part of the membranous portion; of long standing, and for which he has before been under treatment. The obstruction was very hard, and the urethra so much constricted that for three days no instrument could be passed. On the fourth day a No. 1 was introduced, after the patient had been for some time in a hot bath. This was followed by considerable bleeding at the time, and by oozing of blood for some hours after. Finding the urethra in such a tender state, no attempt to introduce a larger instrument was made for two days; and it was not until the 26th of March that the dilator could be used. The delay was occasioned by the extreme tenderness of the parts, and a tendency to hœmorrhage, preventing any protracted manipulation. The difficulty was also increased by the existence of one or two old "false passages," or rather sacs, in the urethra. A No. 10 catheter was passed when the dilator was withdrawn, and every other day afterwards. But little blood followed the operation at the time, although some drops continued to ooze slowly from the orifice of the urethra during the day and the succeeding night, and also after making water for three or four days. He was discharged on the 8th of April, the water passing freely and naturally.

Case 4.—Private J. R., 1st Battalion 16th Regiment. Tolerably robust-looking young man. Reported himself sick on the 9th of April, 1866, stated that he was suffering from stoppage of water, which had first appeared about six months since, after gonorrhœa, and was now getting much worse. No. 3 catheter passed with a little difficulty. Stricture found to be firm, and of considerable length. Admitted to hospital. "Holt's Dilator" with largest sized tube, used on the 10th. A No. 10 catheter passed immediately afterwards, and on every alternate day, until he was discharged from hospital on the 18th of April, eight days after the operation. The stricture was perfectly cured, and the water passing freely, without pain, and in a large and natural stream. Only a few drops of blood followed the removal of the instrument. No quinine or opium given.

Case 5.—Private D. M., 41st Regiment. Admitted on the 18th of April, 1866. A strong-looking and healthy soldier. Has had permanent stricture for several years, and has been often under treatment. The urine now comes away drop by drop. The seat of the stricture was about two and a-half inches from the orifice, and the hardness could be felt externally like a ring of bone under the skin, about three-fourths of an inch in length. Although the stricture was situated in a place so easily reached, more than a week elapsed before any instrument could be passed, owing to its hardness. A No. 1 metal bougie straightened, was at length got through it, and the next day it was dilated sufficiently to allow of Holt's instrument being introduced. A No. 10 catheter was used when the dilator was withdrawn, and every other day until he left the hospital. No hœmorrhage followed the operation. No medicine

given. Discharged from hospital on the 6th of May, perfectly well, and passing water freely.

Case 6.—Private J. B., 49th Regiment. Admitted April 24th, 1866. A strong, healthy-looking man, who presented himself for re-engagement at the expiration of his first term of limited service. It was then found on consulting his medical history, that he had suffered from stricture of the urethra. On making an examination a No. 2 catheter was passed into the bladder with some little difficulty. The obstruction was in the membranous portion of the urethra, and was of long standing. Had been under treatment before, and had had instruments passed, but the stricture had closed up again. On the 26th "Holt's Dilator" was used, and a No. 10 catheter afterwards, and every other day until he left the hospital. No bleeding to speak of followed the operation. No medicine given. Discharged from hospital on the 6th of May, perfectly well, water passing in a good stream.

Case 7.—Private B. W., 98th Regiment. A hardy looking man. Admitted on the 25th of April, complaining of a stoppage of water. No. 2 catheter passed rather easily. Stricture situated in the membranous portion of the urethra. States that it has existed for more than a year, but has lately become much worse. "Holt's Dilator" introduced on the 26th. A No. 10 catheter passed afterwards, and on alternate days until his discharge from the hospital on the 7th of May. Stricture perfectly cured. Very little bleeding after the operation. No medicine given.

THE BROMIDE OF POTASSIUM.

Its Sedative or Relaxing Power in a Case of Stricture of the Urethra.

By Assistant-Surgeon Lane, 2nd Battalion Grenadier Guards.

Private S. W., aged 27 years, had been under treatment for stricture of the urethra for upwards of three years. He was admitted into hospital on the 1st of December with a worse attack than usual. On admission he stated that his stream of water had been getting smaller daily, and that it took him upwards of half an hour to empty the bladder. The catheter was tried, but without success; warm baths, opiates, &c., were employed, but all to no purpose. This state of things continued for upwards of three weeks. He could only pass his water drop by drop, and with much pain. His health failing him, I determined to cut down upon the stricture; but hearing from Dr. Hardie of the 73rd Regiment of the use of the bromide of potassium as a powerful sedative, I resolved to try it in this case. Ten grains were given at bedtime, and the same dose at half-past eight o'clock the following morning. On making my morning visit at 10 A.M., the patient stated he was much easier, and had passed about six ounces of urine. I then tried the catheter, and was surprised to find I reached the bladder with comparative ease with a No. 4 instrument. Previous to the administration of the bromide of potassium, a No. 1 catheter and the finest catgut bougie had several times been tried, but without success. At the end of January, or about six weeks after the patient's admission into hospital, I operated with Holt's Dilator. The man never had a bad symptom, rapidly recovered, and is now doing his duty.

Dr. Rudge of the Artillery had three cases of stricture of the urethra in hospital, one of which had given him much trouble and anxiety. I asked him to try the effects of the bromide. He did so, and gave the same doses as myself—ten grains three times a-day. The result was as satisfactory as in my own case. I have tried the bromide in spasmodic stricture with retention of urine. I give a single dose of one drachm, and the patient is generally relieved in the course of two hours.

CASE OF PENETRATING WOUND OF THE ABDOMEN, AND HERNIA OF THE STOMACH.

Recovery in Fourteen Days.

By Staff Assistant-Surgeon John Anderson, Fyzabad.

Private M. L., of the 1st Battalion 11th Regiment, aged 28 years, service 7¾ years, a strong, active, healthy, temperate soldier, landed in India in November, 1864. In a fracas on the night of the 19th of April, 1865, he was stabbed. He was at once conveyed to the regimental hospital, when he was found to have received a penetrating wound of the abdomen, measuring four inches in length, in the mesial line, midway between the ensiform cartilage and the umbilicus. It was directed somewhat obliquely from left to right, and from it protruded at least one-half of the stomach. Considerable shock was present, the pulse was hardly perceptible, and the surface of the body was cold and clammy. An ounce of brandy and thirty minims of tincture of opium were administered, and the patient rallied. On careful examination it was ascertained that the protruding portion of the stomach was not wounded. It had, however, become partially strangulated by the continued and violent retching of the patient, and was returned to the abdomen with some difficulty. The edges of the wound were then brought together by four sutures, and by strips of adhesive plaster. A fold of lint was placed over these, and the whole kept in position by a broad bandage lightly applied. The patient was then put to bed, and a pillow placed under his knees to relax the abdominal muscles. A pill containing one grain and a half of opium, to be given every six hours, and weak brandy and water as indicated by the pulse; the thirst to be relieved by barley water given in small quantities.

April 20.—Has slept for several hours; pulse good, 80; tongue foul, but moist; no tenderness of the abdomen, except immediately over the wound. The opium pill to be continued; small quantities of arrow-root, with two teaspoonfuls of brandy to be given every two or three hours, as may be agreeable to the patient. The dressings of the wound have not been disturbed.

April 21.—Has passed a good night; pulse 78; no fever; tongue is somewhat cleaner, and still moist; no trace of abdominal tenderness. Continue the opium pill at intervals of eight instead of six hours; half a pint of beef tea to be given every morning and evening; arrow-root and brandy as yesterday.

On April 22 cholera broke out in the station; several cases occurred on the 11th, and all the patients in hospital were removed to a camp three or four miles from cantonments, of which Dr. Hoile, Assistant-Surgeon of the regiment, was directed to take medical charge, and to whom I am indebted for the remaining history of the case. The wound healed rapidly, the opium pills were gradually reduced, and the diet carefully regulated.

On April 26 the sutures were removed, and the bowels gently acted upon by a castor-oil enema; after this tonics were administered, and the diet improved.

On May 3, the fourteenth day from the receipt of the injury, Private L. was discharged from hospital perfectly well.

PALMAR ABSCESS FROM GYMNASTIC EXERCISES.

With Cases by Deputy Inspector-General E. Bradford, Honorary Surgeon to Her Majesty.

The gentlemen cadets at the Royal Military College generally number about 250. They are, during the course of their instructions, put through a course of gymnastic exercises, for which purpose a very complete and commodious building has recently been erected.

It is understood that at present their attendance is compulsory only in the first half year of their stay at the College. In the second half year their attendance is voluntary. These exercises are, however, popular with a large number of the young men, and it is probable that no great proportion of them are habitually absent.

There can be no doubt, generally speaking, that the effect of these exercises is highly salutary. Their beneficial result is manifest in the bearing and activity of the young men. It is, however, probable that their influence is less permanent than that which is commonly ascribed to them. Admitting that the muscular development which results in the limbs and body is desirable, independent of the growth of other organs, and especially of the organs of respiration (which is an opinion open to doubt), it is undeniable that to give these exercises full effect, they should be continued for a much longer time than is devoted to them here, and they should be carried on in the open air.

The young men who are the subject of these observations vary in age from 16 to 22. Their stature varies still more than their age, as is shown by the difference in their weight, which ranges from 7 to 14 stone.

A very large proportion of them have not, on joining the College, attained their full growth, so that no correct inference can be drawn as to the increase of their weight under the practice of gymnastics. Occasionally a few are seen who have scarcely reached puberty. There are moreover always some of feeble frame, with ill-developed chests, the children probably of unhealthy parents, or who have in hot climates or elsewhere been the subjects of disease or accident during childhood. It is often found to be necessary to exempt such from the gymnastic exercises. Great care is exercised to prevent accidents, but nevertheless they have occasionally happened.

It is not the design of this paper to treat of the result of gymnastic exercises in an extended view, but to direct attention to a peculiar form of injury which has been observed to arise from one of them. This is a deeply-seated inflammation and abscess of the palms of the hands, which are induced by the practice of swinging the body suspended by the hands alternately from a horizontal iron bar, or more probably from the horizontal ladder.

The ladder is about seventy feet in length, and is stretched about eight feet from the ground. It consists of two wire ropes, and of a series of wooden rounds of about an inch in diameter.

The exercise is effected by swinging the body while suspended by one hand from one of the rounds, so as to catch another round as distant as can be reached with the other hand. When this is done dexterously, and with the hands in a proper position, it causes no inconvenience; but when the rounds are grasped awkwardly, a degree of twisting and pressure takes place on the palms of the hands opposite the heads of the metacarpal bones, which the soft parts are unable to resist. The deeply-seated flexors, tendons, and muscles become inflamed; and being confined by the rigid palmar fascia, they suffer severely. It is probable that it often happens that the first feeling of soreness and inconvenience is disregarded, and the exercise is continued with the idea that it will give way.

The hands of the young men are not hardened by previous labour, while their weight is considerable.

A very painful condition is thus caused, attended by heat and throbbing, although at first there is little swelling. After three or four days the back of the hand becomes œdematous, and the fingers are separated by swelling. No fluctuation can at first be felt, but at length the presence of suppuration is made evident by the increasing distension between the fingers. If a bistoury is now introduced deeply under the fascia, matter flows in abundance, and great relief is obtained. Suppuration continues for some days, and the hand gradually recovers, but care and attention are necessary to prevent contraction of the fingers. The cases which I have seen have occurred in healthy subjects, and have done well; but it is obvious that, under unfavourable circumstances, mischief and permanent disability might be anticipated.

It will be seen by the description I have given that this injury differs very materially from the superficial soreness and swelling of the hands produced by rowing or by the game of hand-ball. The accident appears to me of so much

importance that I have directed the attention of the authorities to it, with a recommendation that the exercise should be modified.

I append the abstracts of three cases which are recorded in the Medical Register.

CASES.

Case 1.—Gentleman Cadet C. was admitted into hospital May 6, 1863, on account of inflammation of the right hand, caused by exercise in the gymnasium.

May 8th. An abscess has formed deep in the palm of the hand, which is greatly swollen and œdematous at the back. There is an indication of matter between the ring and little fingers. A bistoury was introduced deeply here under the fascia, and a free flow of matter followed with much relief. He had been in great pain, and without sleep.

May 9th. Free discharge is established.

May 16th. Discharged from hospital. The wound healed in a few days after.

Case 2.—Gentleman Cadet W. was admitted into hospital on March 20, 1865, with deep seated inflammation of the palms of both hands, caused by practice in the gymnasium.

March 22nd. Abscess of the left hand was opened by a deep incision under the fascia.

March 25th. Abscess of the right hand was opened by a similar incision.

The discharge was very abundant, and the case proceeded favourably till his discharge on the 1st April. The wounds healed soon after.

Case 3.—Gentleman Cadet C. was admitted on the 21st of August, 1865, with a very painful deep-seated inflammation in the left hand, brought on by practice in the gymnasium. Suppuration was established on the 23rd and the matter was discharged by a deep incision under the fascia, between the little and ring fingers. The wound proceeded favourably, and he was discharged from hospital on the 1st September. Some tendency to contraction of the ring finger ensued, but was obviated by careful treatment. The wound was not finally healed till the 16th September.

CASE OF HYDROPHOBIA.

AT MEERUT.

By Assistant-Surgeon COWAN, M.D., R.A.

SERJEANT M. H., A Battery, 22nd Brigade Royal Artillery, 40 years of age, and of five years' service; a strong, healthy man, employed in the canteen, was admitted into the Royal Artillery Hospital on November 15th, 1865, with symptoms of rabies.

His history showed that on the afternoon of 11th September previous he was bitten in the right-hand by a dog, which two days subsequently died rabid. The Medical Officer who saw him next morning states: "Bitten in the thumb and forefinger. * * * * The wound in thumb is of large size, the canine tooth of the dog having gone through the fleshy part and torn itself out." He was discharged on the 25th September to duty.

When seen about 6 a.m. on the 15th November, he was in an extreme state of terror, very restless, constantly jumping out of bed, and bathed in perspiration. Every now and then he kept hawking up tough stringy mucus tinged with blood, and he had a short harsh cough. His manner was so confused, that he was quite unable to give any accurate account of himself, but from other sources of information it was ascertained that on the day previous he had complained of sore throat after breakfast, and in the evening was so hoarse that he could not call out the men's names at the canteen. Shortly afterwards spasm and difficulty of swallowing came on, and feeling alarmed he came to hospital.

He was at once taken to a separate ward, and 45 drops of tincture of Indian

hemp were injected subcutaneously into the arm. As he complained of thirst some lemonade was brought. While drinking, he closed his eyes firmly and swallowed the liquid greedily and at one draught, and in great terror; but the act of swallowing did not appear to pain him.

7. A.M. Chloroform has been inhaled without any benefit, the spasms being as frequent as before its administration. Forty drops of tincture of Indian hemp have been injected.

8·30 A.M. A straight waistcoat has been applied, as the patient is excessively violent. Of his own accord he warns the orderlies to keep off, lest he should do them mischief. Chloroform has again been tried and seems to ease him, but the spasms increase in frequency and violence. A sponge dipped in brandy and water has been put to his lips, but has only annoyed and terrified him. He now had an injection of brandy and beef tea.

9·45. The convulsions continued to increase, notwithstanding the administration of chloroform and the injection of the tincture, and he died in a fit—twenty-five hours after the appearance of the first symptoms of the disease.

Post-mortem Examination—Six hours after death. Body very muscular, rigid. There was a very distinct cicatrix on the thumb and forefinger of the right hand; no marks of inflammation either at this spot or towards arm.

There was congestion of the vessels of the scalp and arachnoid and of the choroid plexuses. There were bloody puncta on the surface of both hemispheres. There was no apparent congestion at the roots of the 8th pair of nerves. Old signs of inflammation were apparent about the dura mater; this membrane being slightly thickened and attached to the substance of brain near the sulcus.

There was congestion of the pharynx, larynx, œsophagus and stomach with patches of effused blood. The liver was fatty and much enlarged. The blood was fluid throughout the body.

THE OPHTHALMOSCOPE IN RECRUITING.

Two Cases Illustrative of its Use in the Examination of Recruits with Defective Eyesight.

By Staff Assistant-Surgeon R. E. Hogan, Royal Military Infirmary, Dublin.

Professor Longmore in the Introduction to his Ophthalmic Manual, says: "There is only one way in which a diagnosis in these cases of defective vision can be truly arrived at, and that is by means of the Ophthalmoscope."

In illustration of the above statement, and as a proof of the use of this instrument, not only in the detection of disease, but in preserving eligible recruits for the service, who otherwise would be lost to it, the two following cases are recorded which lately came under notice in the Ophthalmic Ward of the General Military Hospital, Dublin:

1. James Love, aged 18 years, born in Greenwich; an agricultural labourer, of healthy constitution, fair complexion, and robust frame; enlisted on the 16th January, 1866, in London, where he was passed as "fit." He left London on the 20th for Dublin, and on the 22nd of the same month was examined by the surgeon of his regiment, but was unable to count the one-fifth inch dots at 10 feet distance with his left eye. The ordinary examination failed to detect any apparent cause of defective sight, and excepting not being able to satisfy the examining medical officer the recruit himself made no complaint. He was brought before a Medical Board on the 28th, when he was again found to be incapable of seeing the dots with his left eye. Having been examined with the ophthalmoscope, he was found to suffer from hyperæmia of the retina and choroid (*incipient choroiditis*), increased depth of colour in the fundus, and considerable distension and tortuosity of the choroidal veins with pinkish optic papillæ. The Board having been satisfied that the defective vision was amenable to treatment, remitted him for further observation. He was admitted the same

day into the General Hospital, Dublin; was cupped to four ounces from the left temple, put upon low diet, and was given saline purgatives. On the 30th he was found to be able to count the dots correctly at the proper distance with either eye, but with hesitation and comparative difficulty with the left singly. Vesicants were then applied to the left temple, and on the 8th of February eleven days after his admission—he could not only count the test dots correctly, but with facility and without delay. The ophthalmoscopic appearances were now normal, and he was sent back to his regiment for duty.

2. Denis Harrington, aged 18 years; born in Tralee; a strong, healthy, agricultural labourer; was enlisted in Tullamore on the 4th February, where he was found "fit." He was re examined on the following day in Dublin, but was unable to count the dots with the right eye—the different lenses in no way improving his sight. As in the former case there were no other external physical signs of impaired vision in this man. It was intended to have him brought before a Medical Board, but by direction of the Principal Medical Officer he was admitted into the Royal Infirmary, Dublin, on the 7th, for treatment and further observation. He was examined by means of the ophthalmoscope on the 8th, and found to suffer from partial retinitis and inflamed optic nerve in the affected eye—the optic entrance being less conspicuous than usual; red, ill-defined, with increased vascularity of the surrounding fundus, and haziness, the vessels not being distinctly traceable. He was cupped to five ounces from the right temple; was given a cathartic and kept on low diet. On the subsequent day he was found capable of counting the test dots with the greatest facility with either eye. The ophthalmoscopic appearances being normal, and his sight continuing perfect, he was discharged from hospital for duty on the 12th. He has since, however, been brought before a Medical Board and rejected for causes distinct from any condition of impaired vision.

Had these recruits, one of whom was most eligible, not been examined with the ophthalmoscope, the Board finding them deficient of the required powers of sight as tested by the ordinary method, would certainly have pronounced them unfit for service on account of defective vision.

CASES OF TYPHOID FEVER, DYSENTERY, AND HEPATIC ABSCESS

OCCURRING AMONG THE ROYAL ARTILLERY AT SECUNDERABAD.

From the Annual Report of Surgeon-Major RANKING, in Medical Charge.

MANY of the cases of ague last year were complicated with hepatitis, and cases of the latter were masked and modified by malarious taint, requiring quinine to be associated with other treatment. This year, although cases of ague have been less numerous, hepatic affections have been common, and three deaths have occurred from hepatic abscess. In other cases abscesses formed and were evacuated by the usual passages, while in one case the abscess pointed at the ninth intercostal space, and was opened. These cases will be commented on in abstract, as they afford evidence bearing upon the question of "prospecting" and puncture of the liver in suspected abscess, which has lately been discussed with so much ability by the advocates and opponents of the measures.

CASE 1.

Febris Typhoides.—Profuse hæmorrhage from bowels. Death on the twenty-eighth day of the disease.

Corporal M. H., aged 23, four years in India.

Was admitted first with "febris intermittens," and it is noted on the 15th August that "he suffered from intermittent fever and diarrhœa, that the fever on that day had left him, but that diarrhœa continued, and that he had been taking acetate of lead and opium without benefit. On the 17th fever recurred, and diarrhœa continued. On the 18th quinine was prescribed in four-grain doses three times daily. On the 19th he complained of more

pain in the right iliac fossa." On the 22nd I was requested to see the patient, "looks pale and anxious, pain about head, with a little deafness, is much debilitated: some fever last night, very frequently to stool, stool watery and yellowish, with streaks of blood, continued pain in right iliac fossa, and on examining the skin over the abdomen some well-marked rose-coloured slightly elevated spots, disappearing on pressure; there is now no doubt of the case being one of typhoid fever."

He was now ordered quarter-grain doses of sulphate of copper, with extract of opium half a grain thrice daily, with nitric acid drink. On the 23rd it is recorded, "a good many fresh spots have appeared; from the 21st he took three ounces of port wine daily with chicken soup." No note was made between the 24th and 31st, on which date it is recorded, "nothing worthy of noting occurred until to-day; the same treatment continued until the 2 th, when acetate of lead and opium was substituted for the former pills, and quinine in two-grain doses three times a-day also administered. The patient has been purged four times last night, and altogether appears much worse. Pulse irregular; tongue brown." The medical officer again resorted to sulphate of copper, raised the wine to fifteen ounces, administered beef tea at frequent intervals, and gave an opiate (morphia, half-grain) at bed time. The pulse was at this time 100. The abdomen tense and tympanitic, with much tenderness in the right iliac fossa; fomentation and turpentine stupes were assiduously used.

During the day of the 4th September large quantities of blood were passed, and the pulse rose to 120. The patient's condition was very precarious. Brandy [four ounces] with eggs, was added to the wine. Blood continued to be passed in considerable quantities during the 5th, and I recommended the use of turpentine in twenty-grain doses; this checked the hæmorrhage, without, however, at all improving the patient's condition, indeed he became hourly worse, exhausted, and died at quarter to 6 P.M of the 6th.

The autopsy revealed the usual pathological lesions of enteric fever. The lower portion of the ileum was studded with ulcers, which were confluent at the extremity of the gut. The intestine was also perforated in two places, and large sloughs of the mucous membrane were found external to the bowel in the iliac region, surrounded with recently-effused lymph. The mesenteric glands were much enlarged, as also the spleen. Ulceration did not extend beyond the ilio cæcalvalve.

REMARKS.

This case is a typical one occurring in a young soldier, and presenting all the features of intestinal fever as it occurs in Europe and America. The characteristic eruption was present.

The next case was admitted as "dysentery," but was as it progressed pronounced to be typhoid fever, and the autopsy revealed the lesions characteristic of both affections.

CASE 2.

Dysentery. Typhoid Fever. Profuse hæmorrhage. Death, with pathological lesions of both affections, on fifty-first day.

Driver M. W., age 21, and three years in India, was admitted on the 4th September, 1864. I quote from the entries in the Case Book.

September 27.—"A delicate scrofulous lad, admitted on the 5th instant, suffering from the ordinary symptoms of dysentery Ipecacuan in large doses was administered. Enemas occasionally, and subsequently Twining's pills. The dysenteric characters of the stools have disappeared for some days. The patient complains of intense pain in the locality of the cæcum; a blister have been applied; the relief afforded has been slight."

October 2.—"Nothing worthy of noting occurred in this case until this evening, when the patient suddenly passed about one pint of pure blood. Astringent enemas were forthwith administered, which proved effectual in stopping the hæmorrhage, a recurrence is much to be dreaded as the intense pain in the iliac fossa, &c., too clearly indicates the existence of extensive ulceration."

September 3, 4 P.M.—"Has had consecutively three motions containing about one quart of pure blood, clotted; no shreds of mucous membrane can be detected in it; this occurred about 12 o'clock."

"*Vespere.*—Immediately subsequent to making the above entry at 4 P.M. the patient had another motion of pure blood. The injection (nitrate of silver forty grains, water four ounces) did not appear to have any beneficial effect. The patient was seen by Surgeon-Major Ranking, who was of opinion that the patient had lapsed into typhoid fever." This was the first time I had seen the patient, and his aspect led me to express the opinion, not that he had "lapsed" into typhoid fever, but that he was suffering from typhoid fever rather than dysentery, and I was disposed to think that he had contracted typhoid from the first case detailed, who died two days after this patient's admission. I did not pronounce a very confident diagnosis, leaving that to be established by further observation. The next day (4th) the characteristic rose spots of typhoid fever appeared. Deafness also existed, and the abdomen was rounded, tense, and tympanitic, pulse 135, and patient's state most critical. I do not dwell upon the treatment, suffice it to say it embraced astringents, as sulphate of copper and opium, the oil of turpentine, astringent injections, opiates at night, and a diet of beef-tea, eggs, wine, and brandy. On the 5th large shreds of mucous membrane were passed, precisely the same (in character) as those discovered lying in the abdomen in the first case. The case fluctuated much. The oil of turpentine was the only remedy which checked the diarrhœa and hæmorrhage; shreds of membrane continued to be passed, and on the 17th it is recorded that he "passed some inches of mucous membrane;" great irritability of stomach was now added to the other symptoms. He lingered till the 26th of the month, at which date at 3 A.M. he expired.

Autopsy, abdomen.—Effusion of lymph, intestines adherent, and other indications of general peritonitis, lower portion of ileum denuded to the extent of several inches of its mucous membrane, in the portion near the cœcum; all the glands were in a state of ulceration, two large perforations in the colon, as well as one large one in the ileum. The colon was attenuated as some twelve inches of its mucous membrane sloughed and were passed off by stool; all the mesenteric glands were enlarged, other abdominal viscera normal. Head and thorax not examined.

REMARKS.

The diagnosis in this case up to the appearance of the characteristic rush was difficult, especially to one who had not watched it from the commencement. The pathological lesions found after death were those both of dysentery and enteric fever. I was present at the autopsy, and can affirm that had any one without any antecedent knowledge of the case been shown the large bowel only, he would have pronounced it dysentery. On the other hand, had the ileum alone been presented to him, he would as unhesitatingly have declared it enteric fever. Which was it? The rash removed the doubt. It was enteric fever, and the fact that the large bowel was so extensively implicated does not I think oppose the diagnosis. Even in Europe implication of the glands of the large bowels is not an unusual complication of enteric fever. The ilioc-cœlic valve does not always constitute a boundary line; on the other hand, in many recorded cases of dysentery in this country allusion will be found to ulceration of the small bowel generally described as extension of the ulceration from the colon. In the epidemic dysentery which prevailed in the "Royal" at this station in 1858, many cases in which both large and small intestines were diseased occurred. In some the small bowel was most involved, in others the large. The then Deputy Inspector-General Dr. Cole, now the Principal Inspector-General of the Department, recorded that there was a "proneness to a typhoid form of fever, with cerebral congestion, synchronously with the dysentery, and it appeared as if there was a relation in the etiology of the two."

The first case I have recorded was a typical case of enteric fever. The second is of a mixed character, and I have now to record a case of hæmorrhagic dysentery occurring in the same battery, and in the person of a soldier who was an orderly attendant upon the first case, which supports the opinion above expressed by Mr. Cole as to the etiological relations of the two affections. A case I may add in which I declined to pronounce a diagnosis in favour of enteric fever solely on the grounds that no eruption occurred. In its general

symptoms it bore very much the aspect of the cases already recorded, and deafness existed, a symptom not observed in dysentery that I am aware of, though commonly noted in enteric fever.

CASE 3.

Dysentery simulating enteric fever.—Death.

Gunner P. C., aged 28, and of seven years service.

"November 4, 1864, was admitted on the 28th ultimo suffering from the ordinary symptoms of acute dysentery; large doses of ipecacuan were administered, also occasional enemata of ipecacuan and opium to allay tenesmus. Yesterday morning all symptoms of dysentery disappeared, and the patient appeared much better. This morning on visiting him I was struck with his haggard expression of countenance, rapid pulse (120), tense and rounded abdomen, and marked deafness. He had been one of the attendants on Case 2, and I, therefore, fear that this will also prove to be a case of typhoid fever."

The existence of deafness, the general aspect of the patient, the condition of abdomen, and I may add the characters of the stools, which I found to consist of a thin ochrey yellow feculence, with bran-like particles floating through them, but without blood; together with the fact of the patient having been an attendant on the other case, led me to coincide that it would probably turn out a case of typhoid fever. Still, in the absence of eruption, I advised the entry of the disease should not be changed. No eruption appeared, and the disease stood as dysentery, and the death is recorded as such.

But to proceed with the details of the case.—On the night of the 4th there was delirium, and the next day his condition was described as "alarming." Skin cold and clammy, pulse almost imperceptible. The motions continued of the same character, but "streaked slightly with blood." Low muttering delirium preceded death, which occurred at 1·30 A.M. of the 6th. The man admitted that he had been ill with "bowel complaint" for seven days before reporting himself sick, and attributed it to getting wet fishing in a neighbouring tank.

Autopsy.—*Abdomen* enormously distended, evidences of general peritonitis, such as effusion of lymph on the surface of the peritoneum, intestines all matted together the latter to such an extent as to render their separation a rather protracted operation, lower five inches of ileum congested, one small ulcerated patch, the entire of the large intestine in a state of sphacelus, the internal lining one mass of sloughing ulcerated patches, *liver*, *spleen*, and other viscera healthy, *head* and *thorax* not examined.

I did not see this case in consultation till the seventh day after admission, and the fourteenth of the disease, according to the patient's statement. I would not commit myself to a diagnosis; but certainly inclined to the opinion that it was enteric fever, rather than dysentery which had preceded the alarming symptoms detailed on the 4th November, and which pointed to peritonitis; lit up it was considered by perforating ulcers of the ileum. The aspect of the patient, the existence of deafness, the shape and condition of abdominal surface, and the character of the evacuations, which certainly resembled those of enteric fever rather than of dysentery, and, finally, the occurrence of the two cases which had preceded it, led to this opinion. The autopsy revealed something more than dysentery. The lower portion of the ileum was very deeply congested, one ulcer resembling an ulcer of enteric fever is recorded, and I would add that the glands, both solitary and aggregate, were unusually prominent and turgid.

The three cases certainly favour the view of "etiological relation." I need not say that every effort was made to determine the probable origin of the typhoid cases.

They were admitted from different barracks, and the last case detailed from a third; certainly they could not be traced to any faults of conservancy; no nuisances existed near the barracks. The latrines are always kept free from any objections. There are no cesspools, and the drainage from the washhouses and kitchens is in this battery good. In the 23rd Brigade, in close proximity, and the bathing rooms and cook rooms of which are undrained, the refuse water sinking into the soil, no cases of the kind occurred.

On the occurrence of the first case, every precaution was taken; the evacuations were deodorized, removed, and buried, after the inspection by the Medical Officer. Deodorants were freely used about the patient's bed. The clothing was, on removal, soaked in a solution of chloride of lime, and rinsed in cold water before being returned to the Purveyor, and due cautionary instructions were given to the attendants.

There remains a case recorded as febris typhoides, and which terminated fatally. I shall detail it only so far as may be necessary to explain the reasons which led to its being recorded as typhoid fever.

CASE 4.

Driver J. S., aged 21, of 3 years service.

"Was admitted on the 14th instant suffering from the ordinary symptoms of bronchitis, subsequently pneumonia of the lower lobe of left lung set in. A blister was applied, and small doses of calomel and opium administered. The patient then suffered from recurrent attacks of epistaxis. He is scrofulous, and his general appearance peculiarly anæmic. All symptoms of pneumonia and bronchitis have now disappeared." He was at this time ordered tincture of sesquichloride of iron, with beef-tea diet, extra tea, and mutton soup.

On the 25th, a return of epistaxis is recorded, with the following remark, "the case is a very obscure one, it is more than probable that it will prove to be a low form of fever, pulse 120. Tongue covered with dark brown fur."

On the 29th the record runs, "patient continues in precisely the same state; pulse, 120; tongue, brown; teeth covered with sordes; * * * he had up to this period no abdominal complications." He was now ordered 18 ounces of port wine, with beef tea and chicken broths. The citrate of iron and quinine in three-grain doses was substituted for the tincture of sesquichloride of iron. I now saw the patient, and the case certainly bore the aspect of a low type of fever. The complexion was dusky and sallow; intellect dull, but there was no delirium. Epistaxis was frequent, requiring constant use of astringent injections into the nostrils. On the 3rd November, sponginess of gums was noted, with profuse hæmorrhage from them also at times. On the 4th, diarrhœa set in, but there was no abdominal tenderness, and no eruption, which was daily searched for. Sulphate of copper and opium were prescribed for the diarrhœa, and the wine was raised to 24 ounces in the 24 hours. On the 8th, low muttering delirium is recorded, and the patient complained of great pain in the *right* hypochondrium, and generally along the *right* side of abdomen. "Pulse 120; tongue more brown than usual, and gums covered with sordes." three ounces of brandy was added to the wine. He expired at noon of this day.

Post mortem appearances twenty hours after death. Body well developed. *thoraæ-pericardium* thickened, and so adherent to the heart, that some difficulty was experienced in separating it. The heart itself was enormously enlarged (weight 23 ounces), no indications of valvular disease. There was a small encysted abscess in the upper portion of pericardium; adhesions were of old standing; lungs healthy.

Abdomen.—With the exception of some enlarged mesenteric glands, and a general anæmic appearance of contents, nothing abnormal in this cavity. Head not examined.

REMARKS.

This case is a remarkable one, the patient never for a single moment suffered from any symptoms that would lead to the inference that disease of the heart existed. On the contrary, all the pain was referred to the abdomen, and the symptoms generally were those of typhoid fever without petechiæ. The heart itself, beyond laboured action, did not appear to indicate the existence of disease, when the hand was placed over it during the progress of the case. To these remarks, I may add that on the occasions on which I saw the patient with him, I invariably counted the pulse, and that it gave no indication by irregularity or intermissions of any cardiac disease; and yet, not only was the heart much enlarged, but the pericardium was universally adherent, except at the spot where the abscess existed, and which was a circumscribed collection of pus, between the layers of the pericardium. There was never any dyspnœa, and "pain was always referred to abdomen and right hypochondrium."

It remains for me now to detail the cases of hepatic abscess, alluded to in a former paragraph.

All of them occurred in the B Battery, 23rd Brigade, under my own immediate care, and are of interest in relation to the question of hepatic abscess by puncture.

The detail of the cases will be made in special reference to this point.

CASE 5.

Hepatic abscess opening into the bowel.—Death.

Gunner J. H., aged 38, of fourteen and a-half years service, an intemperate man, presented himself at hospital on the 14th of July, complaining of the usual symptoms of a subacute attack of hepatitis, viz., pain in side, increased on full inspiration. The hypochondrium full and tender, tongue furred, pulse 100, with pyrexia. Leeches were applied, and compound saline mixture ordered. In the evening, as the pain was not removed, more leeches (fourteen in all) were applied, and he was ordered a dose of James' powder at bed time. On the next day he was much better, pain nearly gone, fever moderated, and pulse fallen to 96. The bowels were fully moved by the compound saline mixture. On the 17th the report is, "very much better, no pain now complained of, no fulness or tenderness of hepatic region, skin cool." The saline mixture was continued, and the diet raised from tea to low pudding. He appeared well through the 17th and morning of 18th, but on the evening of that day he became feverish again, "without any chill or rigor," and on the 19th he was still feverish, but there was "no return of pain in the side." Pyrexia continued through the 19th, "experiencing an exacerbation about noon; but on the morning of the 20th he was cool, pulse 80, bowels open, no pain in side." As he had been subject to attacks of ague, he was now ordered a ten-grain dose of quinine, to be continued in five-grain doses every three hours. There was no return of fever on the 20th or 21st, and on the 22nd the report is, "feels better and complains of no pain, but feels weak and has no appetite." Quinine grains 2, with infusion of gentian was prescribed thrice daily. On the 23rd, however, some feverish excitement recurred towards evening, and on the 24th it is recorded, "gets feverish every afternoon, no chill precedes the fever, which lasts till 8 or 9 P.M., not terminating with sweating. He has no hepatic pain or uneasiness, no pain in back or shoulders, no symptoms indeed, at all referable to the liver. Pulse 85, bowels regular." Quinine in full doses, grains ten, was now ordered to be given two hours before the expected paroxysm of fever. The dose was thus administered on the 24th, 25th, and 26th, with the effect of postponing the attack of fever, and rendering it much lighter; but on the 27th he "complained again a little of the side," and is "a little uneasy on palpation and full inspiration." The side was now painted with strong iodine solution, and quinine continued. The fever, however, continued, and it became evident that it was not a malarious fever, as quinine failed to arrest it. Still there were no marked hepatic symptoms, and on the 31st the report is, "makes no complaint of pain, there is very slight hepatic uneasiness on pressure, but no enlargement of organ. Pulse 100. Case obscure; there may be hepatic abscess, though symptoms are wanting; the type of fever, though it is distinctly intermittent, does not yield to remedies like a true malarious fever." Arsenic was now substituted for quinine, but failed in arresting the fever, though the attacks were "less strong, and last for shorter periods," he now began to emaciate. The pulse ranged at 100, and the appetite was very indifferent. Wine was allowed in moderate quantities, commencing at six ounces, and the diet consisted of soups, principally, with the ordinary chicken diet. On the 9th, the existence of abscess was more than suspected. The report states, "there must be mischief going on in the liver, though there are no marked symptoms. The organ is somewhat enlarged, and he has very trivial uneasiness at times, and on pressure. The right rectus muscle is tense, and there is some fulness of the region," the next day the feverishness is described as more continuous. "Pulse 120. I should add that in the interval occupied by the above reports the side had been blistered, and the blister was repeated on the 10th." On the 14th, he first began to complain of some pain in right back and loins, increased on full inspiration, and the

posture was on the left side, the pain being increased by lying on back or right side; and on the 16th, though easier, the report says, "still has, however, a dull aching pain in the back. Pulse 120, weak; is feverish every night, and for the last two nights has sweated profusely—is emaciating—although the symptoms are not very pronounced, there is little doubt of the existence of deep seated abscess in liver, occupying the posterior aspect of right lobe." The treatment was solely directed to support the strength. The question of "prospecting" was entertained, but abandoned, as there were no symptoms to guide in selecting the spot for operation; no bulging of intercostal space; no spot in which pain was localized; no prominence at hypochondrium. On the 21st, "enlargement of the side with fulness and hardness of hypochondrium were recorded; but it is added there is no bulging of intercostal spaces, and no appearance of pointing." On the 22nd, he passed a large motion, which had "all the characters of containing a large quantity of pus, a pea-soup like stool with flocculi of lymph) floating in it. On the 23rd and 24th he had frequent evacuations of the same kind, and they appeared to afford relief to the hepatic pain; for on the 25th it is written, "does not complain much, has only slight pain, he says, in back and loins." The abscess was considered to have opened into the bowel. He was now very weak and much emaciated, and was kept up by wine, strong soup, and eggs; the powers of life gradually failed; large quantities of pus passed by stool. He lingered till the 3rd September, when he died at 4.30 A.M.

The *autopsy* at noon is recorded as follows:—

"Body much emaciated; no visible enlargement of side, and no particular fulness of hypochondrium. At a spot between the eighth and ninth ribs, posteriorly, at the angles, slight œdema of integument noted, but without any bulging of intercostal space, and no distinct evidence of fluctuation. A trocar entered at this spot gave exit to serous fluid mixed with pus, in a full stream, resembling the fluid passed during life by stool. Trocar again entered at most prominent part of right hypochondrium, but no abscess reached.

Head not examined. *Thorax*, heart, and lungs, healthy.

Abdomen.—Liver very much enlarged both in its right and left lobes, right reduced to be a mere shell, hollowed out into a vast cavity containing many pints of pus; abscess not lined by any false membrane; evidence of much peri-hepatic inflammation, but no adhesions between the anterior border of viscera and abdominal parietes of abdomen. Under surface matted to large intestines by firm adhesions, adherent also to right suprarenal capsule. The communication between the abscess and bowel could not be traced, parts being so friable that they broke down on handling, and the cavity of the abscess even opened. Substance of left lobe more resistant than natural (indurated), but not granular; colour dark; considerable portal congestion; spleen enlarged, sixteen ounces (weight); kidneys large and coarse in texture, congested, but not diseased."

CASE 6.

Hepatic abscess. Profuse hæmorrhage from bowels.—Death.

Gunner J. B., aged 32, of fourteen years service, was admitted stating that he had been ailing three days with fever, which he described as of intermittent (quotidian) type, attended by a loose state of the bowels; he was ordered quinine in combination with Dover's powder and soda. On the 9th, as there was more mucous and blood in the evacuations, ipecacuan in scruple doses twice daily was substituted, and continued through the 10th. This arrested the diarrhœa, and removed all traces of mucous and blood. On the 11th it was recorded, that "the bowels are steady and the motions forming;" he was ordered five grains of Dover's powder thrice daily. Between this and the 14th he made no complaint but of feeling weak. On that date (the 14th) he complained of some uneasiness in the side and shoulder, increased on full inspiration; a blister was applied, which removed the pain, but it is recorded that "he looks poorly, and the tongue is furred at base, red at tip and edges, with patches of the epithelium stripped off, bowels not lax, no fever, pulse 64." On the 19th he did not complain but of feeling weak; he has, however, irregular chills and flushes of heat, but no distinct febrile movement; the blister is discharging; pulse 80; bowels steady; he had, however, a 'catch' on full

inspiration, beneath the right nipple, no cough." Percussion indicated that the liver was somewhat enlarged; he was now ordered the nitro-muriatic mixture. On the 20th at daylight he got up to wash, felt suddenly faint, had an inclination to stool, and passed about two pints of fluid blood, mixed with clots. The report at 6 A.M. states, "is now pale and faint, pulse small, has no tenderness of any part of abdomen, but there is more fulness of hypochondrium and epigastrium, and although palpation does not cause pain, percussion does, producing a feeling of jarring pain in side;" he was ordered small doses of turpentine and mucilage to check the hæmorrhage; blood continuing to pass by the bowel, full cold water enemas with gallic acid were added, and by evening hæmorrhage had ceased. At the evening visit the report is, "is restless; pulse 120: sweats profusely at times;" muriate of morphia (half a grain) with twenty minims of dilute muriatic acid, were prescribed at bed-time; passed a good night, sleeping from 10 P.M. to 5 A.M. On the morning of the 21st he complained of "a good deal of tension pain in side, and liver on being mapped out by percussion afforded seven inches of vertical dulness from the line of the nipple, and the 'intercostal spaces were observed to be somewhat and bulging.' Pulse 120; tongue dry." Wine was administered from the commencement, as the patient was weak and low, in increasing quantities. From this time he gradually got worse, cold sweats set in, and the pulse became more rapid and feeble. On the 22nd the propriety of puncturing the liver was discussed in consultation, but it was agreed that the condition of the patient did not warrant a hope of the operation being of the slightest avail, even if an abscess was reached; and further, that there existed no guide to the points at which puncture should be made, as there was no pointing at any spot, no erdema of surface, no localized centre of pain, while the prominence of intercostal spaces was general, and not limited to any particular region. Death took place at 10·30 P.M of the 22nd.

The autopsy was performed at 8 A.M. on the 23rd, nine and a-half hours after death.

"The body scarcely at all emaciated. Before opening the abdomen a trocars was pushed into the most prominent part of the hypochondrium, no abscess reached; again passed in through the eighth intercostal space in the axillary line, no matter reached; but on introducing it at the ninth intercostal space towards angle of the rib, an abscess was tapped. Abdomen now opened. Liver found to occupy the limits defined during life, to be adherent to the diaphragm, and to present a large abscess on the upper border which was advancing equally towards the lung and pericardium, into either or both of which, had life been prolonged, it would apparently soon have opened; lower part of right lung partly adherent to diaphragm. On removing the liver, its posterior border was hollowed out into a large abscess (the walls formed of broken down hepatic tissue) capable of holding some three pints of pus; liver substance forming boundary of abscess of a deep chocolate hue, with "nutmeg" markings; other parts of the right lobe and entire of left of an ochre yellow colour, and of uniform tint, dense in structure, presenting all the character of cirrhosis.

Cœcum ulcerated; ulcers distinct and separate with elevated margins and deep congestion of the intervening mucous membrane; rest of colon healthy, with the exception of a solitary ulcer at the rectal extremity."

REMARKS.

"The question of exploring for abscess had been anxiously considered during the last few days of this patient's life. None of the signs held by Dr. Cameron to justify, if not to demand puncture, existed. There was general fulness of side, and some widening of all the intercostal spaces, but little actual bulging, no œcema at any spot, and no region at which pain appeared to be localized. The points which, had I punctured during life, would have been selected, did not after death afford to the trocar indications of abscess, but even had the abscess been reached during life, when its size and the condition of the patient (exhaustion from profuse hæmorrhage) are taken into consideration, I do not think the operation would have prolonged life."

I should add that the patient had for some time been employed as a tradesman; had been excused the ordinary duties of a gunner, and, moreover,

was married, and thus had not come under much direct observation; he had been ailing (he stated) some time before reporting sick, often having to desist from his work from a feeling of weakness, some uneasiness in side and shortness of breath. There is reason, therefore, to believe that abscess had formed before his admission into hospital.

CASE 7.

Hepatic abscess.—Evacuated by puncture; subsequent discharge by bowel of same or another abscess.

Gunner T. O. S., aged 25, of four and a-half years service.

"December 1.—Re-admitted with a return of hepatic symptoms, having been discharged on the 21st ultimo. Is reported to be given to 'bouts of drinking;' complains of a very acute pain in side, increased on pressure, beneath the margin of the ribs, and by full inspirations. Is pale and anemic, and constitutionally delicate. Bowels said to be rather lax; pulse 80." Such is the first entry, and he was admitted under treatment for very much the same symptoms on the 3rd October. That he was treated pretty actively, having had thirty-two leeches applied within the first twelve hours, and eight the next morning, with active aperients of calomel and jalap, followed by a blister on the fifth day, under which all acute symptoms yielded; and on the 22nd he was discharged to light duty, but without night guard. On the 1st November as he looked poorly, and on questioning admitted to me "return of pain in side and shoulder, with slight febrile disturbance and constipated bowels," he was re-admitted; there was found to be some fulness and tension of right hypochondrium; a few leeches were applied; a compound saline aperient mixture ordered; and on the 3rd a blister was applied. On the 6th it is reported "he is now much better, there is no fever, no chills, nor sweats." The nitro-muriatic acid mixture was prescribed, with chicken diet and six ounces of wine. From this date there was progressive improvement, and on the 16th it is reported, "doing well, makes no complaint of pain, indeed, says he is well." On the 21st, "feels quite well, and wishes to go to light duty;" he was discharged, but "excused all mounted duties till further orders."

He was readmitted as above shown on the 1st December; a few (eight leeches) were applied, and saline aperient mixture ordered with six ounces of wine, as he was weak. On the 3rd he complained of pain limited to a small spot at angle of eighth and ninth rib, the pain being increased by full inspiration or by pressure into the intercostal spaces. At this time there was no fever, no chills, rigors, nor sweats. The pain was described as worse at night, coming on after getting warm in bed; he never had syphilis. On the 16th there was some swelling, circumscribed and baggy, with an indistinct feeling of fluctuation; pain also experienced at shoulder, no fulness of hypochrondrium, and no indication of enlargement of liver upwards. Since the 12th he had experienced fever, recurring at 11 A.M. daily, without chill or rigor, and quinine postponed, but did not stop it. The indication of abscess pointing became more evident day by day, and on the 23rd the prominent swelling (there was no discoloration of the integuments), was punctured with a bistoury, a small valvular aperture being made, and about four ounces of laudable pus escaped, eight or ten ounces more flowing into the dressings during the day, a full inspiration, or pressure at hypochondrium accelerated the flow; my object in the small opening was to allow the contents of the abscess to drain away slowly, so as to give the inelastic tissue of the liver time to contract, and thus to prevent entrance of air into the cavity. A drain of from ten to sixteen ounces of pus daily, with occasional gushes of larger quantities, went on till the 22nd of January, 1865, when diarrhœa set in, and it was found that large quantities of pus were passing by the stool; in the interval of time just indicated the patient's condition, of course, became worse, but that he bore up well under the constant drain (and allowing twelve ounces daily, the discharge from the 23rd December to the 22nd January, will be about twenty-two and a-half pints), he became daily weaker, requiring careful support by a liberal allowance of wine, brandy, strong beef tea, and eggs. He now lies in a very precarious state, passing large quantities of pus by stool, while the discharge from the side has almost ceased, proving either that the same abscess has opened into the bowel or another communicating

with it. I fear the case must end fatally. It is a very interesting case, and read in connection with the two which preceded it, may afford a commentary upon the probable issue of those cases had puncture by trocar been resorted to and an abscess reached.

In this last case the operation was performed under very, I may almost say the most, favourable circumstances. The patient it is true was constitutionally delicate and intemperate, but not by any means low at the time of the operation. The pointing took place at a spot favourable to operation, and the operation itself was not the plunge of a trocar, but a valvular opening made by a bistoury. The escape of pus, though gradual, was sufficiently abundant daily to prevent accumulations, and at the same time to favour the gradual contraction of the cavity of the abscess; but notwithstanding these favourable circumstances, either the same or another communicatory abscess opened into the bowel, and the condition of the patient is at the time I write much that of a person passing an abscess by the bowel alone.

In the first case detailed (the first is that of "hepatic abscess"), I did not feel myself justified in puncturing prior to the date on which indications were afforded of the abscess having opened into the bowel, for reasons given in the report of the case.

After the abscess had found a vent for itself by the bowel, the operation was not only no longer called for, but would have, in my estimation, prejudiced the well-doing of the patient.

In the next case I did not consider that any guide existed as to the spot to be selected for puncture, while the extreme exhaustion of the patient caused by the profuse hæmorrhage, contra-indicated in our judgment operative proceedings.

The third and last case we have seen was operated on under very favourable circumstances; but the case is, notwithstanding, likely to be fatal, while the operation itself did not prevent the progress of the abscess towards one of its more natural points of escape.

In the progress of the case I had ever before me the arguments in favour of operation advanced by Dr. Cameron, and endorsed by Sir R. Martin (for that high authority has apparently become a convert to Dr. Cameron's views), and the protest entered against it by Dr. Maclean. The result of the third case is certainly most disappointing. Like the first case of Dr. Cameron's it was "slow insidious abscess" opening near the angle of the ribs, but does not promise to "progress to perfect recovery."*

CASE OF YELLOW FEVER SUCCESSFULLY TREATED BY QUININE AND STRYCHNINE.

By Staff Surgeon-Major R. G. D. Banon, Spanish Town, Jamaica.

Private J. C., of the 2nd Battalion 6th Regiment, was admitted into hospital on the morning of the 17th November, 186-, in a half unconscious state, labouring under ardent fever, accompanied with considerable cerebral congestion, sickness of stomach, and inability to articulate, although conscious when aroused and spoken loudly to. He was also labouring under diarrhœa of a bilious character. Conjunctivæ of both eyes, tinged yellow. Fever slightly abated, and he is more conscious.

Calomel purgative with quinine, and Gregory's powder, administered. Body sponged with vinegar and water, and iced water to be constantly applied to the head. Beef-tea, brandy, and ice to be used at intervals. This morning the fever has abated, and consciousness perfectly restored. Eyes tinged with pale yellow bile; skin cool, moist and slightly yellow; pits white on pressure; urine highly coloured and scanty—tested for albumen, there was none. To have a half-drachm dose of sulphate of quinine immediately. Bowels open

* This man has since died, two abscesses, scrofulous in character, existed in the liver.

three or four times since last evening, accompanied with considerable tormina, which was relieved by twenty drops of tincture of hyoscyamus given in camphor mixture.

On the 18th of November, at 11 a.m.—The following to be given regularly every third hour until further orders:—Take of strychnine one grain, rectified spirit one drachm, water seven ounces, mix. Five drops in a glass of water of the above mixture constitutes a dose. The brandy to be omitted; but four ounces of port wine to be given in arrowroot. There is no vomiting, but a tendency to sickness of stomach when pressure is made on the pit of the stomach.

Vespere, 18th November.—Vomited three times during the day; matter ejected rather dark and mixed with food that he had partaken of in the morning; the lemon tinge well marked over the body. He is very drowsy, and not easily roused. Marshall Hall's strychnine solution to be continued as above every third hour. A scruple dose of quinine to be administered immediately. Urine very dark coloured as if mixed with blood; but there is still no appearance of albumen.

November 19th.—No vomiting during the night. Bowels open three or four times, of a bilious character, but not grumous. Lemon-colour of the skin general over the whole of the body; feels very weak; pulse 84, and easily compressed. Beef-tea diet with arrowroot and port wine, and to have brandy and water as a drink during the day in small quantities at a time. Urine still very high, but not albuminous. Scruple doses of quinine to be given every fourth hour, as also the strychnine drops. Body to be sponged all over with vinegar and water. There is still great drowsiness and intolerance of light.

November 20th.—Continues very weak; but if any change it is for the better. Skin becoming clearer, and there has been no return of fever for *thirty-six hours*, or sickness of stomach. Tongue clearer; urine has lost its dark colour, and in natural quantity, *no* symptom of albumen when subjected to the nitric acid test. *He slept better last evening* Same doses of quinine and Marshall Hall's strychnine solution to be continued, with iced milk and lime-water as a drink, in equal parts; as diet—beef-tea, eggs, milk and arrowroot, with oranges, and ice when necessary. Every hope of the case ending favourably if we can keep up his strength and arrest secondary fever.

November 21st.—Slowly improving; but very weak. The varied diet of yesterday continued, with port wine and brandy.

November 22nd.—Continues improving; strychnine solution to be discontinued, and only to have a dose of quinine once a day. Tongue clean and skin clearing; secretions healthy; bowels rather confined; to have a dose of castor-oil. Extras to be reduced, and diet to be more solid and nutritious. Milk and lime-water to be omitted after to-day; appetite good, and he is gaining strength. To have a pint of porter.

November 23rd.—Convalescing; allowed to sit up a little yesterday. Continue the nutritious diet, with porter and port wine.

November 25th.—Was attacked yesterday evening with severe colic, which was immediately relieved by a draught of tincture of rhubarb and cardamoms with tincture of opium. Abdomen very tympanitic. This morning he is convalescent. Same diet and extras to be continued.

November 26th, had a return of colic last evening, which was relieved by the same draught as above. To have five grains of blue pill, and same quantity of compound rhubarb pill immediately.

November 29th. Discharged cured.

SMALL-POX SYNCHRONOUS WITH VACCINIA.

ABSTRACT OF TWO CASES OF SMALL-POX.

By Assistant-Surgeon H. F. PATERSON, M.D., G Battery, 11th Brigade, Royal Artillery, Cawnpore.

On the 13th of January I vaccinated six children, belonging to the Battery, with lymph, from tubes received from the Superintendent of Vaccination at

Agra. In only one of these cases was it successful. The child was healthy and the vaccine vesicle perfect; from it I vaccinated the other five on the 22nd January. In all it succeeded perfectly, but, in the instance of one female child, five and a-half months old, a varioloid eruption appeared on the 7th day from the date of vaccination, viz., on the 29th January.

CASE 1.

January 29th. I was sent for to see the child of Gunner M., which was stated by its mother to have been slightly feverish, and out of its usual state of good health for two or three days. I found it feverish and with constipated bowels. A mild purgative was ordered. I observed a few papulæ about the alœ of the nose, but thought nothing of them; examined the vaccine vesicle and found it perfectly formed and full of lymph.

30th. Child still feverish; bowels opened; the eruption had slightly increased; it was confined to the alœ of the nose, and the forehead presented the same appearance. The vesicle on the arm seemed to have slightly shrunk. The child was coughing a little. A mixture of compound tincture of camphor and antimonial wine was ordered.

31st. The eruption had extended to the neck and was more abundant on the face. It still had a papular appearance. The vesicle had most markedly shrunk, and appeared about to shrivel up. Child less feverish, and taking the breast. Mixture to be continued.

February 1st. The eruption had increased and extended to the body and limbs, but was much scattered and still papular. Vesicle much shrivelled up, appearing like a scab. The child seemed much better, and its bowels were regular. Mixture to be given three times a day.

The mother having taken ill, the child had to be fed with milk and arrowroot.

2nd. Child's limbs becoming covered with the eruption now manifestly varioloid and becoming vesicular. Throat affected. To be kept cool, and a little ipecacuan wine given occasionally. Cough less.

3rd. Eruption increasing. Previous mixture to be repeated.

4th. Child now completely covered with small-pox, becoming confluent on the face, wrists, and ankles. She was very weak, her throat much affected, the face swollen, and the eyes closed. A little weak wine and water was from time to time administered. It still took its milk, though frequently vomiting it. The bowels being freely open, and the cough having left her, no medicine was given beyond washing her mouth with a rag dipped in a lotion of vinegar, borax, and honey. Her body was occasionally sponged with cold water, and the pustules touched with olive oil and glycerine.

5th. She was much worse, the eruption being confluent all over the body. Breathing hurried and oppressed. The eyelid could scarcely be forced open to allow of bathing. Wine to be given or beef tea, a teaspoonful every two hours.

6th. Child still worse; breathing more oppressed, quick, and spasmodic. No medicine given. To be kept as cool as possible; and the beef tea and wine to be continued at intervals.

7th. Died at 5 a.m.

CASE 2.

February 1st. On going to see the child whose case I have reported, I found that the mother had had severe rigors during the previous night, and was now in high fever. She complained of excessive headache, sickness, and pains in the back and limbs, with much weakness.

As she was subject to attack of intermittent fever, I thought that this was probably one of them, though more severe than they usually were. Her bowels were confined, and I gave her a purgative to be followed by saline mixture.

The pains and headache slightly abated towards evening, and the saline was continued, her bowels having been opened.

2nd. She was still very feverish and complained of great weakness, had still headache and pains in the back and loins, though not so severe. As her previous fevers had been quotidian, and this had continued for upwards of twenty-four hours without intermission, I suspected it might have some connection with the eruption on the child, and had the family removed into a small detached bungalow. Mixture continued.

3rd. She continued feverish and weak. Her bowels were constipated, and an enema of castor oil was ordered. Chicken broth to be given and four ounces port wine. Surface of the body to be sponged with vinegar and water.

4th. She felt much better; there was less fever, but her face, neck, and wrists were covered with a red efflorescence, in which there were numerous minute papula distinct to sight and touch. Her bowels had not been freely opened, and the enema was repeated and acid saline mixture given. In the evening, as constipation still remained, calomel and jalap were given, and a morphia draught ordered at bedtime as she had passed a sleepless night on the 3rd. Lemonade and soda-water ad libitum were daily given.

5th. The eruption distinct and vesicular on the face, neck, chest, and limbs. Bowels freely open. Beef tea and wine were administered as she was very weak.

6th. Eruption increasing all over the body, and becoming pustular and confluent on the face and wrists. She was delirious during the night, but was now cooler, easier, and sensible. Throat much affected, eyes swollen and congested. A gargle of alum, borax, honey and vinegar was ordered, and weak zinc lotion for the eyes. Beef tea and chicken broth were freely administered, and wine to 4 ounces continued.

7th. Very weak, pulse quick but small; tongue hard and dry. She was in a state of low delirium, and unconscious of the death of her child. She had passed a very bad night. Enemata of beef tea and opium were ordered every two hours; this made her drowsy, but did not produce sleep. At bed-time, 45 drops of tincture of opium were given, as the solution of morphia seemed to be useless.

8th. Had a little sleep and passed a much better night. Was aware of the death of her child, and talked rationally, but with difficulty on account of her throat; said she felt certain of dying soon. Eruption confluent over the whole body; great salivation; face much swollen and eyes closed. Eruption becoming brown. Her mouth to be frequently washed out with gargle. She complained much of her feet being painful, but did not feel the eruption elsewhere. A liniment of glycerine, olive oil, and belladonna seemed to give her most relief. Beef-tea, wine, and chicken-broth to be freely given.

9th. Complains much of her throat; was restless and weak. Eruption becoming still darker, especially on the face. Carbonate of ammonia and compound tincture of camphor to be given every three hours in camphor mixture, and the enemata of beef tea and opium to be repeated.

10th. She had all the symptoms of bad typhoid fever; very quick, weak, compressible pulse, low delirium, blackened tongue. The eruption had fallen off in patches from some parts of her face and limbs, leaving dark petechial spots. Wine and beef-tea to be continued, and a mixture containing carbonate of ammonia and brandy to be given every half hour. She did not improve at all towards evening. Mixture to be continued during the night.

11th. Symptoms less marked. She was not so restless during the night; is now occasionally sensible, but generally in low, muttering delirium. Mixture and beef-tea and wine to be continued. At night, 50 drops of tincture of opium were given, and the opiate enemata repeated.

12th. She was weaker, otherwise the symptoms remained the same. More of the eruption falling off, leaving the same dark petechial appearance of skin. Treatment to be continued.

13th. She was evidently sinking, though more frequently sensible, and occasionally talked rationally and resignedly of her approaching end. There was frequent subsultus tendinum. Treatment continued.

14th. Died at 7 a.m.

No post-mortem examination was made in either case, on account of objections made by the father of the child.

Remarks.

The mother's arm bore distinct marks of previous successful vaccination; and according to her own and her husband's statement, she had small-pox in 1857, which was also severe, and from the effects of which she suffered for three months, though she bore no marks of pitting. She stated to me also that when

vaccinated as a child, an eruption like small-pox had come out all over her body.

The chief points of interest in these cases are, its occurrence on a child with a perfect vaccine vesicle on its arm; its occurrence too at about the time when the secondary eruption would have appeared had the child been inoculated with small-pox; its being confluent on the mother, who had been vaccinated who (as stated) had a varioloid eruption at the time of vaccination, and who (as stated) had previously had small-pox.

At the date of the commencement of the first case, there had been no small-pox in the military cantonment, though it existed in the city of Cawnpore. The father of the child had been in the habit of going to the city, and my belief is that he was the means of carrying the contagion, and that the child had contracted it previously to its being vaccinated.

The vaccination could scarcely have had anything to do with its origin, as the lymph was taken from the arm of a healthy child (with no eruption on the body), and the other four children, vaccinated from the same vesicle, had not the slightest trace of an eruption, though the operation succeeded perfectly in all.

No other cases occurred in cantonments.

CASE OF PHTHISIS PULMONALIS, WITH TOTAL DESTRUCTION OF ONE LUNG.

By Staff Assistant-Surgeon JOHN F. FOSTER, St. Peter's, Jersey.

PRIVATE J. P., *of the 2nd Battalion 1st Foot, 28 years of age, was admitted into hospital on the 10th of June, 1865, complaining of cough and increasing debility. He has lately lost flesh very rapidly, and sweats much at night.* He was only last year re-enlisted for a further term of service, his first ten years having expired.

He states that he had good health until last February, when he caught a severe cold, and soon after began to spit blood. He had cough ever since, and continued occasionally to spit blood, but did not expectorate much besides. Being an officer's servant, and disinclined to go into hospital, he had concealed his disease until his admission, but felt too weak to continue his duty longer. On examining his chest I found it flat, with very little expansion during inspiration. There was dulness of the left side on percussion; but the right apex was very hollow, and the cracked-pot sound was easily heard. Moist crepitation was heard in both lungs, and pectoriloquy was remarkably distinct. I felt certain that a large cavity existed in the right lung. His breathing was quick and short, pulse fast and feeble, and voice peculiar. I could not obtain from him any history of hereditary predisposition. He had not had hæmoptysis for six weeks.

The treatment consisted of ten minims of tincture of iodine, one drachm of rectified spirit, and five grains of iodide of potassium in an ounce and a half of water twice a-day, and an ounce of cod-liver oil twice daily, while an occasional drachm of tincture of camphor was administered. *He also inhaled the steam of hot water and vinegar, to relieve a dry sensation in his throat.*

Under this treatment he improved slightly until the 21st, when profuse night sweats commenced. He did not now cough or spit much, but continued to waste. I then discontinued all former treatment, except the oil, and gave him twenty drops of the tincture of muriate of iron in an ounce of water three times a-day; and directed his body to be sponged with vinegar and water at bedtime. He improved considerably, the night sweats almost ceased, and on the 27th he was discharged to the hospital at head-quarters to be invalided.

On the 6th of July he was sent back to the hospital, having become too ill to go to England to be invalided.

He was now much thinner and weaker, but still had very little cough, and no expectoration, and was very sanguine that he would recover. The right side of the chest sounded very hollow on percussion, and there was an absence

of all vesicular murmur. The left side was dull, with moist crepitation and increased vocal resonance. The night sweats continued very profuse. During the month he rallied once or twice, but eventually dropsy and delirium came on, and he died greatly exhausted on the morning of the 31st.

The treatment on this occasion consisted of cod-liver oil (of which he could take but little) and tonics, with generous diet and stimulants. He never had much cough, and did not expectorate, but his breathing became excessively quick and short. He did not suffer from diarrhœa. Owing to his great weakness, the stethoscope was seldom used; so that although a very large cavity was diagnosed, the extraordinary condition revealed by the post-mortem examination was not fully recognised.

SECTIO CADAVERIS, thirty-four hours after death.

External Appearances.—Body very much emaciated; *rigor mortis* well marked.

Thorax.—On dissecting the pectoral muscles from the right side, a large escape of fœtid gas took place from the interior of the chest, the cavity having been opened in consequence of intercostal bulging. The sternum and costal cartilages being removed, a vast cavity was disclosed, occupying the whole of the right side, and containing about a quart of creamy pus. Its walls were very thin and flaky, and there was no false membrane; the pleural cavity had entirely disappeared, and not a portion of lung tissue remained. It was crossed about its centre by a thin band, which broke down on the slightest pressure, and did not appear to consist of obliterated vessels. At the root of the lung there was an exudation of fibrous material surrounding and closing both the vessels and bronchus. The cavity in fact was bounded on all sides by the costal pleura, and contained nothing but gas and liquid pus.

The left lung was somewhat shrunken, and there was a pint or two of clear fluid between the pleuræ: it was strongly adherent to the diaphragm and ribs posteriorly, and its whole substance was thickly sprinkled with miliary tubercle, in which softening had barely commenced. There was a small patch of engorgement on the lower lobe.

There were some slightly ulcerated spots on the epiglottis and vocal cords.

The heart was healthy, but rather pale and thin.

Abdomen.—The peritoneal cavity contained several pints of fluid.

The liver was soft and pale, adhering very strongly to the diaphragm. The spleen was of a pulpy texture. The right kidney was healthy; the left rather large and pale, and the capsule slightly adherent.

The stomach was slightly congested at one spot; otherwise healthy.

The intestines generally were pale and bloodless.

REMARKS.

This case is interesting, and, so far as I know, singular, as I cannot find another recorded instance of the total destruction of a lung.

Louis, in his invaluable work on phthisis, mentions that "by the term vast excavations we understand those whose capacity equals the volume of a goose's egg, a man's closed hand, or even larger;" and Dr. Watson, when speaking of the size vomicæ may attain, says, "they may be large enough to contain a pint or more of fluid," and this seems to be his idea of their maximum extent. Walsh goes further; and, in his book on diseases of the lungs, third edition, page 435, when describing the anatomical characters of the softening stage of phthisis, writes, "eventually almost the entire area of a lung may be represented by a single huge excavation."

Louis, in his first "Observation," gives a very remarkable example of the great size to which tuberculous excavations may attain, in which the right lung presented a large and deep hollow formed by an excavation which was judged to occupy three-fourths or four-fifths of the total volume of the lung. It reached from the summit to within three-quarters of an inch of the base of the organ, and from the posterior part to within half an inch, or nearly so, of the anterior. "Its parietes were extremely uneven, presenting, in many places, fragments of pulmonary tissue greatly changed, and on the point of being detached; no false membranes were observed." "The right bronchus opened into this enormous cavity, about half an inch after its entrance into the lung," yet the lung possessed "a tenth of its volume capable of respiration." (!) In

his remarks upon this case he observes, "notwithstanding the great extent of the disorder, there had only been very slight hæmoptysis," and "the progress of the affection was rapid." It is impossible to say from his account how long the patient was in hospital, but the disease had been active for at least six months before her admission.

I have quoted this case at some length, as it bears considerable analogy to my own, and seems to be the most remarkable destruction of lung tissue hitherto recorded; yet there are some differences between the two, and for that reason I have contrasted them.

Had Louis's patient lived a short time longer, there can be no doubt that the whole of the lung would have suppurated; but it is that very point which constitutes one of the most singular features of my own case. That the man should have been able to live for even the shortest period with only one lung, and that one small and choked with tubercle, is surprising.

In both cases there was only slight hæmoptysis, and considering the large size of the blood-vessels obliterated, this is sufficiently astonishing (though Louis does not state that the main trunks of the pulmonary artery and vein were divided); but in the one case quantities of purulent matter, and even solid portions of the lung, were expectorated, while in the other scarcely any expectoration occurred. It will be said this was owing to the closure of the bronchus; but for how long was the bronchus closed? Certainly not at the time the cracked-pot sound was to be heard, and it was easily produced a month before his death.

Again, both cases were rapid, but mine more so; and I believe that it is only in these rapid cases that huge excavations can occur, as in the slower ones the constitution becomes overpowered by the tubercular diathesis, and the patient is unable to resist the local attack.

CASE OF HEPATIC ABSCESS.

In which the Patient survived the Operation of Tapping 49 Days.

By H. M. Fraser, Esq., M.D., Surgeon, 2nd Battalion Rifle Brigade, Meerut.

Private D. K., 2nd Battalion Rifle Brigade, age about 24 years, of scrofulous diathesis and delicate appearance, was admitted into hospital under the head of *Palpitatio cordis*, on the 24th of October, 1865; his general health also being so much impaired that it was intended he should be brought before the Annual Invaliding Committee, in view to his being sent to England. Service in India on admission under one year.

On the 27th of the same month, while an hospital patient, he was suddenly seized with acute parenchymatous inflammation of the liver, characterized by tenderness and fulness of the right hypochondrium, increased on taking a deep inspiration, or coughing, and in the right shoulder; inability to lie on the right side, or back; the decubitus being on the left side. Shortness of breathing, sympathetic cough, fever, thirst, and scanty urine.

Half-a-dozen leeches were ordered to be applied to the side, mustard sinapism, and frequent turpentine fomentations. Internally, a saline purgative, with three grains of ipecacuanha powder every fourth hour. On the three following days the symptoms continued urgent. On the 28th October he had half-a-dozen more leeches applied to the side, and the ipecacuanha and turpentine fomentation were continued. On the 29th, the fever had assumed a typhoid type, and the ipecacuanha was ordered to be discontinued; the following prescription being substituted: ten grains of extract of taraxacum and fifteen grains in half-an ounce of mucilage and the same of water three times a-day.

The same treatment was continued on the 30th October; but his pulse being quick and compressible, evincing debility, two ounces of sherry were ordered.

October 31st. Very bad this morning; the pain and tenderness in the hepatic region most intense; pulse quick, weak, and compressible; countenance

sallow and anxious looking, bowels open. The taraxacum and alkali were ordered to be discontinued, and two grains of James' and two of Dover's powders given every third hour. Hot linseed poultices were applied over the right hypochondrium, and three ounces of sherry administered.

November 1st. Seems better this morning; the pain in the liver is less intense than it was, and his pulse is stronger. Stated that the linseed meal poultices gave him great relief. Treatment as yesterday, and four ounces of sherry given.

On the 2nd he continued in much the same state and the same treatment was continued.

On the 3rd he had great pain over the anterior surface of the liver, most intense at one spot. In that situation there was a *bulging* with rigidity of the rectus muscle and a doughy feel at each side. Dover's powder continued. Linseed meal poultices and fomentations locally.

November 7th. About 12 o'clock at noon on this date he was suddenly seized with most intense pain in the abdomen. The abdomen became swollen and tensely tympanitic, and the pain so intense that he could scarcely breathe. He screamed violently on the slightest pressure. Knees flexed on thighs, and thighs on abdomen—dorsal decubitus. There was an impression that an hepatic abscess had burst into the sac of the peritoneum, and so caused the shock and peritonitis; but on enquiry he stated that he felt nothing burst or give way. Pulse 130, small, weak, and compressible; respiration doubled in frequency, and purely thoracic; lips covered with *sordes*. Three grains of sesquicarbonate of ammonia in solution, and one grain of opium in a pill, were given every hour for three hours, brandy-and-water *ad libitum*; warm water and turpentine fomentation frequently repeated over the abdomen.

Nov. 8th. Abdomen still very much swollen and painful; a doughy swelling on the anterior surface of the liver and a little to the right of the mesial line, and about an inch above the umbilicus. He is on his back, with his knees drawn up, unable to bear pressure or movement. Pulse 130; feeble and compressible. The same treatment continued.

Nov. 9th. He was so ill during part of the previous night that it was not thought he could live much longer. Abdomen tense as a drum; pain intense; pulse almost imperceptible. Brandy and large doses of opium were frequently administered, and he rallied much under this treatment, and notably improved.

Nov. 10th. He was better, the pain and tenderness decreasing, and for some time afterwards he went on apparently steadily improving.

Nov. 22nd. He was attacked with acute pain over the anterior surface of the liver, which lasted about two hours.

On the 23rd, a doughy swelling was felt over the anterior edge of the liver, and pointing externally. He was free from pain, but had a feeling of weight in the right hypochondrium.

Nov. 25th. A consultation was held, and an abscess was diagnosed, which it was determined to evacuate by trocar. This I did at 11 o'clock.

When the trocar was withdrawn, about two ounces of dark venous blood welted forth, which was followed by about five ounces of sanious pus, and then all flow ceased. The quantity of actual pus thus emitted was very small.

The canula having been withdrawn, the wound was dressed with *lint* soaked in warm oil, upon which a pledget of lint was placed, and both kept in position by straps of adhesive plaster. Over all a warm linseed poultice was applied, and thirty minims of chloric ether and forty of tincture of hyoscyamus were given as a draught in two ounces of camphor mixture.

In addition to chicken diet he was ordered strong beef-tea, and occasionally some sherry with egg beaten up in it. At five o'clock P.M. he was without pain, had a warm, moist skin, and was altogether in a favourable condition. He was now ordered a similar draught to that he had had after the operation. He slept well on the night of the 25th without an opiate.

Nov. 26. No fever, skin moist and warm; pulse 104. Had some fugitive pains on the right side, but nothing of consequence. A bran poultice was applied over the punctured part, and ten minims of nitro-muriatic acid in an ounce of infusion of quassia ordered three times a-day.

Nov. 27th. This morning the dressing was removed from the puncture, which had healed underneath. The tenderness and pain were now much less.

There was some hardening around the punctured parts, but the bulging had subsided. He slept well last night; appetite good, and altogether his state is very favourable.

Nov. 29th. Improvement very decided; spirits good; pulse about 100; tongue clean; skin moist; appetite good.

Without going fully into further details, I may state in general terms that for some time after the operation the case went on most favourably, the abdominal swelling disappeared, the strength very considerably increased, so much so that the patient was able to get up and go about; his appetite became very good, and there seemed every hope of an ultimate recovery. His skin was generally warm and moist, with a quick pulse, but the cardiac affection from which he suffered rendered it difficult to determine to what these symptoms should be attributed, and the improvement in his general health was the most marked about this period. He would have been considered in a fit state to proceed down country, as one of the invalids of the season, for England, had the party started early in December.

From the 29th November up to the 8th December the case presented no marked feature worthy of interest, further than that on the whole the patient appeared to be going on most satisfactorily.

On the 30th November he had a slight attack of diarrhœa, and at times he suffered from paroxysms of pain (apparently owing to flatulence), symptoms which were very amenable to treatment.

On the night of the 8th December he was attacked with cough and pain in the right side of the chest, followed by bloody purulent expectoration to the extent of about four ounces; apparently symptomatic of another abscess having burst into the lungs.

From this date the purulent and bloody expectoration continued daily to a greater or less extent; some days very copious, on others but slight, and at times attended with most intense pain and tenderness in the right hypochondrium; the pain extended upwards through the right side of the chest, inside of right shoulder joint, and down the arm.

On the 20th December diarrhœa also came on, but it was very amenable to treatment. On the 24th he had slight febrile symptoms, which gradually disappeared under the use of quinine.

On the 2nd January, 1866, he suffered from sickness of stomach, which was so irritable as to reject all food. A sinapism to the epigastrium and small doses of chloroform internally removed this.

From this date he became gradually weaker, although the symptoms were on the whole not very urgent.

On the afternoon of January 13th he became insensible, and expired about twenty minutes afterwards.

The treatment latterly consisted mainly of the administration of mineral acids and tonics, quinine, the application of opiate poultices, &c.

Nourishing diet, including eggs, beef-tea, stimulants, with champagne and brandy and soda water, were freely given.

I may add that during his illness, as well as prior to the hepatic attack, the patient suffered from cardiac disease, a circumstance which rendered it impossible to form satisfactory conclusions with reference to the progress of the former affection from the state of his pulse.

Further, the treatment of such a case at the time in the wards of the European Infantry Regimental Hospital at Meerut, was rendered less satisfactory from the character of the accommodation, none of them having *fire places*, while the weather, about the period the chest affection was most urgent, was sometimes very cold, with a considerable fall of rain for the season of the year.

The following *post-mortem* appearances were presented about fourteen and a-half hours after death:—

Body—very much emaciated.

Left Lung and Pleura—healthy.

Heart—considerable pericardial adhesions, also fibrous deposit on the aortic valves of old standing.

The upper portion of the anterior surface of the right lobe of the *liver*, was found to be broken down into one purulent mass; the diaphragm, peritoneum,

and pleura adjoining, as well as the base of the right lung, being found in the same condition.

There apparently had been originally two abscesses in the *right lobe of the liver*, a *superior* and an *inferior*; but the portion of the liver between them had broken down. The *lower* abscess seemed the earlier of the two. It was it which had been tapped on the 25th of November last. The wound caused by the tapping had perfectly healed, and on dissection its site could not be detected. Its cavity was in process of repair. The *upper* abscess contained a large quantity of mingled blood and pus. The upper border of the superior abscess was formed by the base of the right lung, which was in a purulent condition up to about the fourth rib, above which were pleuritic adhesions.

The intestines were healthy.

ARMY MEDICAL SCHOOL.

THE attendance of medical candidates for commissions in H. M.'s British service during the last three sessions was as follows—

The *Ninth* Session, or Winter Session of 1864-5, was attended by 77 candidates; the *Tenth*, or Summer Session of 1865, by 38; and the *Eleventh*, or Winter Session of 1865-66, by 16.

Admission to the School was obtained by public examination at Chelsea; and further competitive trials were held at the close of each session at Netley.

The order of precedence in which the candidates for H. M.'s British service were eventually arranged to be gazetted was fixed according to the combined results of these two examinations, and is shown in the lists which follow.

The questions put at both the Chelsea and Netley examinations are also given.

In the early part of the year 1865, the authorities decided that the vacancies in the Medical service of H. M.'s Indian army should again be filled up as formerly by Medical Officers appointed for special service in India,* and candidates for this service were examined simultaneously, and under the same conditions as those for H. M.'s British army. These gentlemen were ordered to pass through the courses of instruction at the Army Medical School, and, accordingly, since the commencement of the Tenth Session, in April, 1865, they have been present at the School, in addition to the candidates for H. M.'s British service above enumerated,—27 during the Tenth Session, and 20 during the Eleventh Session.

The order of precedence in which these gentlemen were arranged is shown at pages 570 and 574.

* The last occasion on which similar appointments were made was in October, 1860. See the volume of Army Medical Reports for the year 1860, p. 480.

NINTH SESSION.—WINTER, 1864-65

COMBINED RESULTS of the Examinations at Chelsea, in August, 1864, and at Netley, in February, 1865, showing the Total Number of Marks obtained at both Examinations.

Order of Merit as finally settled.	Names arranged in the Order of Merit for both Examinations.	Total of Marks at both Examinations.	Order of Merit as finally settled.	Names arranged in the Order of Merit for both Examinations.	Total of Marks at both Examinations.
1	W. H. Jameson	5,247	40	W. E. Riordan	3,426
2	R. Harvey	5,020	41	J. Bourke	3,417
3	J. H. C. Whipple	4,813	42	J. Murray	3,405
4	J. Cleghorn	4,640	43	J. B. Kelly	3,399
5	W. W. Tomlinson	4,545	44	D. C. G. Bourns	3,397
6	W. J. N. Price	4,497	45	J. F. Welsh	3,396
7	J. F. Duffy	4,490	46	J. H. Hughes	3,337
8	J. Bennett	4,396	47	J. W. Jones	3,331
9	T. F. O'Dwyer	4,310	48	S. E. Walker	3,292
10	J. P. H. Boileau	4,305	49	J. F. Blake	3,290
11	H. Cook	4,302	50	A. B. Robinson	3,284
12	W. Carpenter	4,295	51	D. A. S. Thorburn	3,247
13	G. McI. Campbell	4,202	52	E. R. O'Brien	3,178
14	J. F. Foster	4,190	53	J. MacCully	3,170
15	S. Farquharson	4,160		W. H. Jagoe	3,170
16	W. Keir	4,040	55	W. J. Blake	3,163
17	L. Corban	3,925	56	C. B. Smith	3,135
	T. Tuite	3,925	57	J. Duhy	3,116
19	W. Taylor	3,895	58	E. Haward	3,097
20	P. A. Smith	3,887	59	F. Dickinson	3,040
21	J. McLean	3,855		A. C. Grose	3,040
	R. G. Power	3,855	61	A. Barrie	3,038
23	P. Shepherd	3,832	62	S. Doake	3,027
24	W. T. Hedley	3,793	63	S. Flood	3,000
25	J. W. P. Purcell	3,782	64	G. B. West	2,993
26	R. D. Kemp	3,756	65	D. J. Canny	2,975
27	S. W. Handy	3,705	66	E. Vallance	2,967
28	E. O'Sullivan	3,699	67	J. Candy	2,861
29	A. E. Hale	3,690	68	J. W. Ryan	2,785
30	J. M'Creery	3,646	69	C. Hutchinson	2,735
31	H. C. Gillespie	3,630	70	E. Eustace	2,705
32	C. Spurway	3,530	71	F. G. Peatfield	2,693
33	W. McConnell	3,528	72	J. R. Coulter	2,619
34	J. Hector	3,520	73	C. Backhouse	2,600
35	W. L. Eames	3,512	74	E. Ward	2,581
36	C. E. M. Shaw	3,494	75	J. Maturin	2,537
37	A. Dunn	3,490	76	D. Renton	2,455
38	V. Stone	3,469	77	C. Healy	2,392
39	K. Macaw	3,460			

CHELSEA EXAMINATION, AUGUST, 1864.

ANATOMY AND PHYSIOLOGY.

1. Describe the superior maxillary bone; state also its relations to other bones and to the various blood-vessels and nerves.

2. Describe the wrist-joint; and enumerate, in the order in which they occur, the tendons, nerves, and blood-vessels in immediate or close relation with it.

3. Enumerate the muscles placed on the anterior aspect of the forearm, giving the origin, insertion, and relations of each. Give also the course and relations of the ulnar artery and nerve.

4. Describe the cœcum, including the ilio-colic valve; and state the differences of structure between the large and small intestine.

5. Enumerate and classify the various excretions, stating the average daily amount of each in a healthy adult man; and indicate the sources whence they are derived, and the channels through which they are eliminated.

Surgery.

1. What are the most common causes of retention of urine in the child, in the adult, and in the old man?

2. Describe the morbid appearances usually met with in the urethra, in the bladder, and in the kidneys, in a case of long-standing stricture.

3. What are the characters of the fluid in hydrocele of the spermatic cord, in hydrocele of the tunica vaginalis, and in encysted hydrocele of the testicle and epididymis? What is the treatment of hydrocele in the infant?

4. Describe the different forms of ganglion of the wrist, their diagnosis and treatment.

5. Describe a case of psoas abscess, its diagnosis and treatment.

6. A lad is shot in the ham, and on examination three or four holes of the size of swan-shot are found in the centre of this region. The lad is taken to bed, and shortly afterwards complains of violent pain in the foot and leg. This continues all night, and by the next morning all the parts below the seat of the injury are found to be in a state of well-marked mortification, traces of which are already extending up the lower part of the thigh. What is the diagnosis in this case, and what the proper treatment?

Medicine.

1. Describe fully a case of scarlet fever, with all its possible sequelæ, and give the appropriate treatment for every stage.

2. Give the signs, on percussion and auscultation, of the following diseases:—

(1) Phthisis, third stage, with cavities.
(2) Pleurisy, with great effusion.
(3) Pulmonary emphysema.
(4) Enlarged heart, with regurgitant disease of the aortic valve.
(5) Effusion into the pericardium with coincident endocarditis of the aortic valve.

3. Describe the after-death appearances you would expect to find in very severe cases of typhus and typhoid fevers respectively.

4. What are the chief causes of obstinate vomiting?

5. Describe a case of puerperal fever.

6. What are the usual doses of the following medicines: Corrosive sublimate, arsenious acid, tincture of opium, tincture of digitalis, extract of Indian hemp, sulphate of copper, tincture of the seeds of colchicum, tincture of the sesquichloride of iron? State in which diseases you would employ arsenic, digitalis, sulphate of copper, and iron.

Natural History.

1. State concisely the general distinctions, structural, physiological, and chemical, between the animal and vegetable kingdoms.

2. What are the characters of the class Insecta? Give examples of its orders.

3. What are the principal races of Man, their characters and geographical distribution?

4. Enumerate the chief parasitic animals which infest man; give the orders to which they belong, their habitats and mode of propagation.

5. Compare the skeletons of a Hawk, Pigeon, and Duck.

6. What are the microscopical characters of bone? Distinguish the bones of a Mammal, Bird, and Reptile.

7. How are Dicotyledonous plants classified? Illustrate the answer by British examples.

8. Describe the structure of the Stem, Leaf, Inflorescence, and Flower of a Grass.

9. What does the Seed of a flowering plant essentially consist of?

10. In what organs and tissues of plants are fixed and essential oils severally most prevalent?

11. What are the orders of the class Cryptogamia, and what are their characters?

12. What are the characters of Amber, Jet, Diamond, Quartz, Felspar, Mica, Talc, Granite, Hornblende, and Slate?

[Candidates desirous of having their proficiency in Structural and Descriptive Botany tested, will have plants laid before them for this purpose.]

NETLEY EXAMINATION,—FEBRUARY, 1865.

A. Written Questions.

1.—Military Hygiene.

1. If you were called upon to give your opinion as to the desirability of a certain water supply which it was proposed to use for a garrison of 5,000 men, what points would lead you to an opinion, firstly, as to the sufficiency of the supply; secondly, as to the purity of the water?

2. If an outbreak of diarrhœa affected suddenly a number of persons in a limited area, what would be the most probable causes, and how would you ascertain the existence of those causes?

3. What are the principal causes which produce movement of air in rooms, and at what rate does movement become perceptible? What are the regulations as regards cubic space per head at home and abroad, and what are the recommendations of the Barrack Commissioners in respect of the quantity of air which should be given per head per hour in barracks?

4. What are the chief diseases which at present cause mortality in the West Indies and the Mauritius, and what are the chief rules of prevention?

2.—Military Medicine.

1. Give as complete *an account as you can of the causes* which produce (*a*) typhus, (*b*) dysentery, and (*c*) phthisis in armies.

2. Describe the general and special indications of the treatment in the typhus of armies.

3. Give the causes, symptoms, diagnosis, consequences, and treatment of enlarged spleen.

3.—Military Surgery.

1. Describe the treatment you would adopt on being called to a recent case of gunshot wound of the abdomen, under each of the following six conditions:—

(1) one opening, without direct evidence whether the projectile has or has not penetrated the cavity of the abdomen;

(2) one opening, the cavity being evidently opened, but no complication being visible;

(3) wound penetrating the cavity, complicated, with hæmorrhage externally;

(4) wound with protrusion of the intestine, the intestine itself being unopened;

(5) the same, but with intestine opened; and

(6) two penetrating wounds, without visible complications?

2. Explain the way in which the eye is enabled to see objects at different istances, and the method by which the range between the nearest and the most distant points of distinct vision may be determined and expressed. Show also how, when presbyopia exists, its degree and the means of correcting it can be ascertained.

3. Give an outline of the surgical duties and of the general arrangements for the care of the sick and wounded under the ordinary circumstances of troops on the march in time of war.

4.—Pathology.

1. Define what is understood by syphilis. Describe the characters, probable periods of incubation, duration, and consequences of the various primary venereal sores; and state what kinds of eruptions or sores on the organs of generation may be confounded with venereal sores.

2. Define what is understood by pyæmia and hospital gangrene. Describe

the circumstances which tend to induce and propagate the morbid states which these terms comprehend.

3. Describe and interpret the prominent lesions seen in the post-mortem examination of * * *, who died, aged 23, of chronic dysentery, and was dissected on Jan. 6th, 1865. The points to be attended to in your accounts are as follows:—

(1) What were the anatomical signs in the small intestine which pointed to the nature of the Common Continued Fever, which he was said to have had in Hong Kong? State the name of the Common Continued Fever it is probable he had.

(2) What were the conditions of the colon and rectum?

(3) Of the liver? and

(4) Of the lungs?

B. Practical Examination.

1 & 2.—Military Surgery and Medicine.

Examination, historical account, statement of diagnosis, prognosis, effects of proposed treatment, etc., of one surgical and one medical case.

3.—Hygiene.

1. Examination of various specimens of Water for Chlor. Sod., for organic matter, and for total hardness.
2. Examination and analysis of specimens of Milk and of Beer.
3. Microscopic examination of samples of Coffee and Flour.

4.—Pathology.

1. Demonstration of the urinary tubuli and cortical portion of a microscopic preparation of a kidney.
2. Description of various preparations of morbid anatomy.
3. Examination of secretions.

TENTH SESSION—SUMMER, 1865.

Combined Results of the Chelsea Examination in February, and of the Netley Examination in August, 1865.

1. Names of Candidates for the British Medical Service arranged in order of Merit, with the total Number of Marks:—

Order of Merit as finally settled.	Names arranged in the Order of Merit for both Examinations.	Total Number of Marks. (Maximum 6,900).	Order of Merit as finally settled.	Names arranged in the Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900).
1	V. Wearne	5,602	20	W. O'B. White ..	3,410
2	R. Collins	4,080	21	R. H. Carew	3,398
3	F. O'Farrel.....	3,995	22	C. White.....	3,343
4	S. Robertson	3,979	23	A. J. Clapp.....	3,263
5	W. R. G. Hinds..	3,940	24	J. H. Evatt.....	3,252
6	A. Lewis.....	3,937	25	T. R. King	3,200
7	R. E. Hogan	3,915	26	J. Creed	3,149
8	G. B. Sanders....	3,910	27	A. W. Shedden ..	3,145
9	G. Andrew	3,737	28	R. Keith	3,117
10	A. J. Belemore ..	3,728	29	A. W. Bate.....	3,035
11	W. F. Ruttledge .	3,683	30	G. F. Churchill ..	2,965
12	F. Powell	3,653	31	T. A. Pickering ..	2,915
13	W. Robertson....	3,635		J. F. H. Richardson	2,915
14	G. Traynor.....	3,598	33	J. W. Purefoy ..	2,858
15	J. E. Fishbourne .	3,563	34	H. Waghorn	2,770
16	R. F. Tobin	3,530	35	W. Wakefield....	2,635
17	R. Jackson	3,500	36	G. White.....	2,532
18	J. A. Campbell ..	3,435	37	G. R. O'Toole....	2,525
19	J. J. Hanrahan ..	3,423	38	J. C. Thorp.....	2,293

2. Names of Candidates for the Indian Medical Service, arranged in the Order of Merit, with the Total Number of Marks:—

Order of Merit.	Names arranged in the Order of Merit for the Chelsea Examination.	Marks obtained at Chelsea. (Maximum, 3,400.)	Order of Merit.	Names arranged in the Order of Merit for the Chelsea Examination.	Marks obtained at Chelsea. (Maximum, 3,400.)
1	Kenneth McLeod.	2,410	15	J. Kelley.....	1,565
2	*H. Cook	2,220	16	A. Brown	1,530
3	*J. Cleghorn.....	2,215	17	L. D. Spencer....	1,500
4	*R. Harvey	2,120	18	T. E. Ffrench....	1,455
5	J. B. Lyon	2,037	19	*J. T. Welsh	1,447
6	R. Reid	1,905	20	S. B. Hunt	1,440
7	A. Porter.....	1,860	21	J. Williams.....	1,432
8	B. Knowles.....	1,722	22	W. S. Fox	1,415
9	A. Skeen	1,715	23	*A. Barrie.....	1,355
10	*J. Bennet	1,651	24	D. McCarthy	1,325
11	R. B. Thomson ..	1,625	25	W. S. Ransom ..	1,250
12	J. R. McIver	1,618	26	J. A. W. Spence..	1,228
13	E. B. Gardner ..	1,610	27	A. McDiamond ..	1,140
14	S. Dickering	1,605			

* Those six gentlemen whose names are marked with asterisks passed the Chelsea Examination in August, 1864, for admission into the general service, and were at the Army Medical School during the winter 1864-5. They subsequently volunteered for H. M. Indian Service, and went through a second examination at Chelsea, in February, 1865.

CHELSEA EXAMINATION, FEBRUARY, 1865.

Anatomy and Physiology.

1. State the spinal nerves which enter into the formation of the cervical axillary and lumbar plexuses respectively; describe the general arrangement of the nerves, and enumerate the branches of each plexus.

2. Give a general account of the structure and functions of the lymphatic and lacteal system.

3. Describe the origin, insertion, and functions of the muscles of the soft palate and pharynx.

4. Describe the shoulder-joint, noticing, in the order in which they are placed, the muscles, nerves, and blood-vessels in immediate relation with it.

5. Describe the urinary bladder, and its relations in the male subject to the surrounding parts; the different conditions it presents in various degrees of fulness, and at different periods of life; and point out the character of the epithelium in different parts of the urinary passages.

Surgery.

1. Describe the morbid appearances commonly observed about the brain and its membranes in a case of severe concussion.

2. Which of the vertebræ in the cervical, dorsal, and lumbar regions are most liable to fracture; and, in a case of fractured spine with paraplegia, is any benefit likely to be derived by trephining?

3. What may be the consequences of a traumatic rupture of the urethra, and what plan of treatment would you adopt in such a case?

4. Describe the process of union by first intention, and of union by second intention.

5. Describe the operation of tying the external iliac artery.

Medicine.

1. Describe the symptoms of Measles, Scarlet Fever, and Diphtheria, stating especially the differential diagnostic marks. Give the treatment of the last disease.

2. Give the signs on percussion and auscultation in the following diseases:—Acute Bronchitis; Pulmonary Tuberculosis in the first stage, and after large cavities have formed; Emphysema; Pericarditis, dry and with great effusion; Hydropneumo-thorax.

3. What are the causes and symptoms of Ascites?

4. What are the most usual sediments in the Urine, and what would be causes of the appearance in some quantity of epithelium cells, or of blood, from different parts of the genito-urinary tract in men?

5. What are the chief causes of flooding during and after labour; how would you treat a case occurring immediately after delivery, and again twelve hours afterwards?

6. Enumerate the principal pharmacopœial preparations of potassium; give the doses of the preparations you mention, and state briefly under what circumstances they are usually employed.

NATURAL HISTORY, &c.

Answer five or more of the following questions.

1. What are the distinctive characters of the Orders of the Vertebrata?

2. To what divisions of the Animal Kingdom do the principal human Entozoa belong? Enumerate the species under the organs they principally affect.

3. From what animals are coral, sponge, whalebone, spermaceti, musk, and ivory obtained? Give the scientific names of these substances, and of the animals that produce them.

4. What are the characters of the Natural Order Leguminosæ and of its tribes? Give examples of each tribe from the pharmacopœia.

5. What is the order of development of the floral organs of a complete hermaphrodite flower?

6. Explain and illustrate the doctrine, that all floral organs are modifications of the foliar.

7. How does the reproductive process differ in phænogamous and cryptogamous plants?

8. By what characters are gums distinguished from resins; fixed from essential oils, and colloids from crystalloids?

9. Enumerate the principal vegetable diuretics. Give their scientific names and native countries.

10. What is Ammonia, in what combinations does it occur in nature; how is it artificially obtained?

11. Enumerate the six metals having the highest specific gravity, and the six which yield the most important medicinal agents.

12. Explain the principles upon which the specific gravities of solid, liquid, and gaseous substances are determined, and give the ordinary methods of determining them.

13. What are the products of decompositions of animal and vegetable substances respectively; and in what way do they affect the health of persons exposed to them?

14. Explain tersely the terms endosmoses, specific heat, chemical combination, æstivation, inflorescence, vernation, conduction, radiation, refraction, endemic, sporadic, innervation.

NETLEY EXAMINATION.—AUGUST, 1865.

A. WRITTEN QUESTIONS.

1.—MILITARY HYGIENE.

1. What amount of sickness does a Regiment on Home Service usually furnish? Supposing this sickness to be in excess, and to be in the form principally of dyspeptic and diarrhœal complaints, with occasional cases of typhoid fever, and that you attribute this to something wrong in the barracks, what points would you particularly investigate, and how would you investigate them?

2. What has been the medical history of the White Troops serving in

Jamaica? Supposing the diseases which formerly caused mortality to return, what preventive means would you adopt?

3. What are the weights carried by the British Infantry soldier? How may these affect his health? What amount of daily exercise ought a healthy adult of the soldier's age to do, and what is the extreme amount of work which he may be called upon to do? What amount and kind of food would you give—

(*a*) under ordinary circumstances,

(*b*) when men are undergoing excessive fatigue, as in war?

2.—Pathology.

1. Give an account of the appearances seen in examination of the body after death in cases of acute dysentery; and describe how the characters and extent of the lesions may be modified by the influence of certain dietic causes of ill health (cachexia). State the place which dysentery holds in the Classification of Diseases you are directed to follow in the Army Medical Regulations.

2. Describe the anatomical characters of amyloid degeneration, as you have seen this degeneration in the kidney, the liver, and the intestines. Give the composition of the test solution used to determine the presence of the degeneration.

3. Describe the prominent lesions seen at the post-mortem examination of Lance-Corporal * * * *, who died July 12th, 1865, and whose body was examined on the following day. He had completed 10 years of service, and had served in Malta (1 year), in Bengal (8 years), and (the remaining period) in England. He had suffered from ophthalmia at Malta; from erysipelas and remittent fever in Bengal, followed by ulcers on the legs, for which he was invalided, after suffering from them for five years. These ulcers occasionally healed up. He was admitted into this hospital on June 27th, 1865, with open ulcers on the lower extremities, and on the 2nd July (*the fifth day after admission*) he was *seized with shivering. Two days after this shivering, he complained of* pain on micturation, and great pains *referred to the perinœum.* He passed his urine with difficulty. There was no history of stricture. The urine passed was turbid, and contained both pus and albumen. The symptoms during the termination of the case indicated septicœmia, with evidence of and abscess in the region of the neck of the bladder. The case terminated fatally on the 12th July, ten days after the shivering.

The points requiring your attention are as follows:—

What were the nature and condition of the ulcers?

What the condition of the femoral veins?

Of each kidney?

Of the bladder and surrounding parts? and

Of the lungs and pulmonary vessels?

And, lastly, give an account of the Pathology of the case, the probable immediate cause of death, and connect the lesions seen in post-mortem examination with the indications of disease during life.

3.—Military Surgery.

1. You are required to record in your Case Book a full report of the case of an invalided soldier, who has recovered from a gunshot wound of the chest. To what circumstances in the history of the case, and to what physical observations of the patient before you, would you chiefly direct your inquiries with a view to determine what the true nature of the injury has been—whether a non-penetrating or penetrating wound of the cavity, and, if the latter, whether accompanied or unaccompanied with a wound of the lung?

2. Describe and explain the different conditions of vision which follow the use of atropine when employed so as to produce paralysis of the accommodatory function, according as the eyes thus acted upon are emmetropic, myopic, or hypermetropic.

3. To what causes may pyæmia be usually traced when it occurs in field hospitals, and what precautions should be taken to prevent its occurrence?

4.—Military Medicine.

1. Give the best sketch you can of the influence of military life on the health of the British soldier in India, drawing your illustrations from what you

have observed in the Royal Victoria Hospital, and gathered from your studies here.

2. Describe the different conditions under which insolation has been observed in India, and the causes which, in addition to heat, seem to produce it. Give

(*a*) the best preventive, and

(*b*) the best curative treatment.

B. Practical Examination.

1 and 2.—Military Surgery, and Medicine.

Make an examination of the case of * * * . You are required to write concisely a history of the case, your diagnosis, prognosis, the probable effects of treatment, and the influence of the disease, or injury, on the man's fitness for service as a soldier.

(Twenty minutes allowed for the examination; half-an-hour for the description. Written notes may be taken.)

3.—Hygiene.

(*Three hours allowed each day.*)

1*st Day*—

Chemical and microscopic examination of various samples of Water.

2*nd Day*—

1. Chemical examination of adulterated Beer.
2. Microscopic examination of adulterated Milk.

4.—Pathology.

1. Describe the morbid specimens numbered respectively 1, 2, 3, 4, and 5; and in your description embrace the following points—

(*a*) name the part shown;

(*b*) describe exactly the lesions which it exhibits;

(*c*) describe how the lesions have originated, and name the diseases of which they are significant, and the period or stage of the disease which had been arrived at; and

(*d*) connect your account of the condition of the parts with the probable phenomena during life.

2. Examine microscopically the portion of organ given you; name the organ of which it is a part, and give an account of its morbid condition.

3. Demonstrate the urinary tubules, with their contained functional cells, and leave the preparation properly displayed under the microscope.

ELEVENTH SESSION.—WINTER, 1865-66.

Combined Results of the Chelsea Examination in August, 1865, and of the Netley Examination in February, 1866.

1. Names of Candidates for the British Medical Service arranged in order of Merit, with the Total Number of Marks.

Order of Merit as finally settled.	Names arranged in the Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900).	Order of Merit as finally settled.	Names arranged in the Order of Merit for both Examinations.	Total Number of Marks. (Maximum, 6,900).
1	J. J. O'Reilly....	4,485	9	H. J. O'Brien....	3,680
2	W. M'Watters ..	4,310	10	P. Le F. Kilroy ..	3,480
3	R. N. Maley	4,308	11	W. Alexander....	3,468
4	W. A. Catherwood	4,260	12	R. W. Lowe	3,435
5	E. J. Clarke	4,183	13	J. E. Purdon	3,423
6	W. Johnston	3,963	14	E. A. Connellan..	3,176
7	E. F. D'Arcy	3,903	15	H. W. A. M'Kinnon	3,045
8	G. B. Monat	3,776	16	J. F. Brodie	2,860

2. NAMES of Candidates for the Indian Medical Service, arranged in the Order of Merit, with the Total Number of Marks.

Order of Merit.	Names arranged in the Order of Merit for the Chelsea Examinations.	Marks obtained at Chelsea. (Maximum 3,400.)	Order of Merit.	Names arranged in the Order of Merit for the Chelsea Examinations.	Marks obtained at Chelsea. (Maximum, 3,400.)
1	J. King	2,210	11	R. G. Matthew ..	1,410
2	H. O. Wilson	2,135	12	W. Duncan.....	1,390
3	W. Center	2,055	13	H. T. Chapman ..	1,310
4	W. B. Purves....	1,870	14	D. J. Walsh	1,305
5	G. Orton.....	1,580	15	R. M. Milne	1,290
6	R. Deacon	1,495	16	J. B. Thomas....	1,260
7	P. J. Hefferman ..	1,490	17	G. Massy.....	1,185
8	D. G. Massy	1,475	18	G. C. Ross	1,150
9	G. Thomson	1,460	19	R. Power.....	1,135
10	R. Jameson	1,425	20	J. Knox	1,115

CHELSEA EXAMINATION, AUGUST, 1865.

ANATOMY AND PHYSIOLOGY.

1. Describe the boundaries of the upper opening of the thorax; enumerate the parts which pass through it; and state their relative positions.

2. Describe the situation and relations of the sympathetic ganglia in the head and neck; and their connexions with each other, and with other nerves.

3. Describe the origin, course, distribution, and anastomoses of the peroneal, recurrent interosseous, superior pancreatico-duodenalis, ascending pharyngeal, and middle meningeal arteries.

4. Describe the mode of development, structure, functions, and relations to the embryo and to the mother of the placenta, allantois, amnion, and umbilical vesicle in the human subject.

5. Describe the ciliary muscle, and the sphincter of the iris, and the dissection required to expose them.

6. Define the terms "secretion," "excretion," "reflex action," "homologous," "metamorphosis."

SURGERY.

1. Describe the appearances observed in contusion of the bones of the skull, and the consequences to which such contusion may give rise.

2. The diagnosis, prognosis, and treatment of fracture of the ribs, with injury to the lung.

3. The treatment of retention of urine in the adult.

4. Describe the different modes of treatment in popliteal aneurism, and the reason why you would select one mode of treatment in preference to another.

5. Describe the operation of tying the sub-clavian artery in the third part of its course.

MEDICINE.

1. Describe the fully developed eruptions in the following diseases: small-pox, cow-pox, lichen, typhoid fever, purpura, miliaria, herpes, and in describing them mention if there are any other diseases with which they might be confounded.

2. What do you understand by the term tubercle? What are its most usual seats in the young, and in the adult? Describe the post-mortem appearances in a case of fatal tubercular meningitis. How would you treat a case of rapid phthisis with repeated hæmoptysis?

3. What are the physical signs in pneumonia (all stages), cancer of the lung, and pulmonary apoplexy?

4. What are the chief causes, and what are the effects of the enlargement
(*a*) of the right ventricle of the heart;
(*b*) of the left ventricle of the heart?

5. What are the chief causes of inertia of the uterus during labour? How would you treat such a case on the two suppositions

1st, That the presentation is natural;

2nd, That the presentation is abnormal?

6. In what diseases is arsenic used in medicine? What are its physiological effects, and what are the symptoms of chronic arsenical poisoning?

NATURAL HISTORY, &c.

You are requested to answer not more than six of the following questions. No marks will be given for loose or insufficient answers.

1. Describe the functions of Respiration, Absorption, Assimilation, and Transpiration in Plants.

2. What are the proximate principles of Plants; how are they distinguished from those of animals; and what chemical changes do they undergo in decomposition?

3. What do the Reproductive Organs of Cryptogamic plants consist of?

4. Define tersely the Nat. Orders Ranunculaceæ, Cruciferæ, Rosaceæ Rubiaceæ, Solaneæ, and Orchideæ.

5. What are the chief forms of Inflorescence? illustrate them by examples.

6. Describe the process of germination in a Dicotyledonous and Monocotyledonous seed, and in Fern spore.

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1. Define the Orders of the class Mollusca, and give examples of them.

2. What are the Races of Man? give their prominent characters and distribution.

3. Describe the Order Ruminantia, and give examples of its tribes.

4. Describe the development and structure of a Hair, Feather, and Cat's claw.

5. What are the microscopical characters of the bone of Mammals, Birds, Reptiles, and Fish? What are the general characters of the vertebral column in each class?

6. What are the properties of Ambergris, Pepsine, Musk, Whalebone, and Spermaceti, and from what animals are they procured?

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1. Explain the actions of the Pulley and Lever.

2. Upon what principle is the Barometer constructed; how is it affected by the humidity of the air; and how are heights measured by its means?

3. Explain the principles of the simple lens and compound microscope, and of achromatic glasses.

4. What are the chemical and physical properties of water? explain the rationale of its conversion into vapour, steam, and ice.

5. What is meant by the Atomic Theory, Latent Heat, Specific Heat, and Sensible Heat?

6. Define the terms Elasticity, Viscosity, Plasticity, Rigidity, Capillarity, and illustrate them by examples.

NETLEY EXAMINATION.—FEBRUARY, 1866.

A. WRITTEN QUESTIONS.

1.—MILITARY HYGIENE.

1. Give an account of the present system of ventilating barracks on home service. State what amount of air must be supplied to maintain proper purity of air, and how you would ascertain that the air of a room is pure and is being supplied in proper quantity.

2. What is the evidence that cholera may be produced by impure water? How would you detect organic impurity in water, and how would you remove it?

3. Give a brief account of the amount of sickness and mortality on home service, and in the West Indies, and state what preventive measures you would adopt against typhoid fever at home, and yellow fever in Jamaica.

2.—Military Medicine.

1. Give a general description

(*a*) of the symptoms of yellow fever;

(*b*) the geographical limits within which it can be propagated, the temperature necessary for that propagation, the elevation above the level of the sea to which it is usually restricted, and any remarkable exception to the rule of elevation with which you are acquainted; state

(*c*) whether it is a form of malarial remittent, or whether it is specifically distinct;

(*d*) what are the conditions which most favour its propagation?

(*e*) what advice would you give to the officer in command of troops in a town or garrison attacked or threatened by the disease? describe

(*f*) the arrangements you would make for treating the sick, should the disease establish itself among the troops.

2. Give a definition of cirrhosis of the liver, its cause, its consequences, and its final results, with an account of the management of a case

(*a*) in the early,

(*b*) in the later stages of the disease.

3. What are the causes that appear to excite heart diseases in the army? What are the signs of mitral disease? Describe the phenomena in their natural sequence which lead in this disease to a fatal termination, and the best mode of mitigating their effects as they arise.

3.—Military Surgery.

1. What are the characteristic features of wounds inflicted by bayonets? Name the chief points to be attended to in the treatment of a stab by one of these weapons.

2. Describe the various kinds of wounds of the bladder which result from musket-balls, the complications which occasionally accompany them, and their treatment.

3. What are the optical effects produced by removing the crystalline lens, as in an operation for cataract, according as the eye operated upon has been previously emmetropic, myopic, or hypermetropic?

4.—Pathology.

1. Describe the lesions which are peculiar to typhoid or enteric fever, and characteristic of that disease. Describe them as regards

(*a*) their anatomy;

(*b*) their progress and development in relation to the progress and duration of the fever;

(*c*) the modes in which the lesions heal or prove fatal.

2. Mention the normal temperature of the human body at completely sheltered parts of the surface (say axilla); and give a concise account of the pathological significance of records of temperature, taken daily, in cases of acute diseases, and the precautions to be observed in taking the observations.

3. Describe the prominent lesions seen at the post-mortem examination of Private J. C., who died January 14th, 1866, and whose body was examined on January 18th. He had completed one year and four months' service, and was 25 years of age. His service had been at home and at Malta. When at Malta in August, 1865, he was attacked with continued fever, which was followed by rheumatic fever, cardiac pains, and endocarditis. A permanent aortic bruit followed this last illness. On admission here in December last, he was emaciated, his face was puffed, and his ancles were œdematous. He had frequent attacks of dyspnœa, with harassing cough. The cardiac bruit was loud and systolic, and heard loudest at the base and along the course of the large vessels. Describe

(*a*) the lesions seen in the heart and pericardium;

(*b*) the condition of Peyer's gland;

(*c*) the condition of the spleen;

(*d*) the condition of the kidneys.

Give a pathological summary of the case, and state the probable immediate cause of death.

B. PRACTICAL EXAMINATION.

1.—MILITARY MEDICINE.

Make an examination of the case of * * * You are required to write, concisely, a history of the case, your diagnosis, prognosis, the probable effects of the treatment, and the influence of the disease on the man's fitness for service as a soldier.

(Written notes may be taken; twenty minutes allowed for the examination, thirty for the description.)

2.—MILITARY SURGERY.

Write a description of any one of the preparations which you choose to select out of the four placed upon the table, and indicated by the letters A, B, C, and D. Describe the surgical injury which the preparation illustrates, and state any facts with which you are acquainted in reference to it, bearing upon diagnosis, the pathology of repair, or treatment.

(Twenty minutes allowed for observing the preparation, and one hour for writing your remarks upon it.)

3.—MILITARY HYGIENE.

1. Chemical examination of various specimens of Water.
2. Examination, for acidity, of a sample of Vinegar.
3. Microscopic examination of a sample of adulterated Mustard.

4.—PATHOLOGY.

1. (*a*) Name each of the parasites in the jars marked respectively A, B, C, D, and E.

(*b*) State what parts of the bodies of men or animals they each inhabit;

(*c*) Mention the probable source whence each may enter the body of man.

2. Examine microscopically, by section or otherwise, the portion of tissue in the *gallipot before you; state of what organ it is a part*, and describe its morbid condition.

3. What are the lesions shown in the preparations numbered respectively 1, 2, and 3? Mention the diseases of which they are the results, and the probable stage of the disease to which they correspond.

4. Determine the magnifying power of any one of the four microscopes marked 1, 2, 3, and 4, appending the magnified image of the scale used.

CIRCULARS, GENERAL ORDERS, MEMORANDA, &c.,

HAVING REFERENCE TO THE OFFICERS OF THE ARMY MEDICAL DEPARTMENT, FROM 1ST APRIL, 1865, TO 30TH JUNE, 1866.

Medical Branch.
No. 1.—65.

Circular Memorandum.

Damage of medical store in transit.

Regimental Medicine Chests, Fracture Boxes, and other articles of Hospital Equipment having been recently in many instances injured by rough usage during transit from one station to another, or the contents damaged from bad and insufficient packing, the attention of Medical Officers is directed to this subject; and it is requested that in future due care be taken in the packing and cording of chests, &c., previous to a move, and that every effort be made to ensure care in transit.

In all cases the Medicine Chests should be distinctly marked—"Glass, with care."

When losses from breakage occur, or other injuries are sustained, during the transit of the Hospital Equipment in question, the Medical Officer in charge should apply to his immediate Commanding Officer to assemble a Board of Officers for the purpose of investigating the cause of such damage, and recording the circumstances under which it occurred, and the parties responsible for the same. The proceedings, when approved by the Officer Commanding, should be returned to the Medical Officer for transmission to this Department, in order

that the necessary steps may be taken to replace the articles destroyed, or repair the damage. In all other cases of loss or damage to Medical Equipment, the Medical Officer will be guided by the instructions contained in the Medical Regulations, at page 89.

J. B. GIBSON, Director-General.

Army Medical Department, 10th March, 1865.

Circular Memorandum.

(Addressed to the Army at Home and Abroad.)

Horse Guards, S.W., 11th May, 1865.

Gen. No. 340. Army Hospital Corps 1—(1865).

Re-engagement of A. H. C. men.

His Royal Highness the Field-Marshal Commanding-in-Chief, at the instance of the Secretary of State for War, directs that Non-Commissioned Officers and Men who have joined the Army Hospital Corps from the Medical Staff Corps or Militia, and whose first term of service is about to expire, are to be allowed to volunteer into a Regiment of the Line, *pro formâ*, and re-engage in the usual manner, on the understanding that they are to be transferred to the Army Hospital Corps for service therein, so long as their conduct is satisfactory.

By Command,

J. YORKE SCARLETT, Adjutant-General

Circular Memorandum.

(Addressed to the Army at Home and Abroad.)

Horse Guards, S.W., 26th May, 1865.

General Number 341. Discharges. 4—(1865.)

Time-expired men, physically unfit to re-engage.

With reference to the Royal Warrant dated 17th August, 1864, Circular No. 872, His Royal Highness *the Field-Marshal Commanding-in-Chief* desires it to be notified that the Secretary of State for War has consented that all time-expired men who are willing to re-engage, but who are not permitted to do so on account of their physical unfitness, shall receive the allowance of twenty shillings, but that those men who are ineligible for re-engagement, on account of their past conduct, shall receive five shillings only.

The grant of the higher allowance cannot, however, be extended to the cases of men who are unfit both physically and on account of their bad character, especially when the physical unfitness is the result of their own misconduct.

Such men will be held to have been rejected on account of their conduct, and will receive five shillings only; but as the issue of 5*s.* or 20*s.* will depend solely upon the *causes assigned in the Discharge* for rejection, His Royal Highness enjoins Commanding Officers to exercise especial care in dealing with such cases.

With this view the Regimental Board will, in deserving cases, state in both the discharge documents that the cause of discharge is "in consequence of being prevented by disability from re-engaging." But in case of rejection on account of conduct, the cause of rejection will appear in the "proceedings" only,—the parchment certificate stating "his limited service having expired."

By Command of His Royal Highness
The Field-Marshal Commanding-in Chief,
JAMES YORKE SCARLETT. Adjutant-General.

Circular Memorandum.

(Addressed to the Army at Home and Abroad.)

Horse Guards, S.W., 9th June, 1865.

General Number 342. Army Hospital Corps. 2—(1865.)

All hospital servants to have a copy of their regulations.

It being considered advisable that each Non-Commissioned Officer and Private of the Army Hospital Corps, or other hospital servant, should be in possession of a copy of the "Regulations for the guidance of Hospital Servants," His Royal Highness the Field-Marshal Commanding-in-Chief hereby directs that such book of Regulations shall form part of the equipment of the above-

mentioned soldiers, and be forthcoming at each monthly inspection of necessaries.

The War Office will supply these Regulations at the public expense

By Command of His Royal Highness
The Field-Marshal Commanding-in-Chief,
JAMES YORKE SCARLETT, Adjutant-General.

Circular No. 916. (Pay.)

24 / 1st, 23rd Foot. / 3

Home and Foreign (exclusive of India).

War Office, 26th July, 1865.

Stoppages for medical comforts.

The Secretary of State for War, with the concurrence of His Royal Highness the Field-Marshal Commanding-in-Chief, has decided that when medical comforts are issued from Purveyors' Stores to soldiers, who either cannot be treated in a Military Hospital or, if treated therein, are not provided with hospital diet, under the Army Medical Regulations, an extra stoppage of 5½*d.* shall be made. Such sum (being the difference between the usual stoppage for bread and meat and the rate of hospital stoppage) shall be charged for each day such men remain under medical treatment; and it is hereby notified, for the guidance of Paymasters, Purveyors, and others, that in future a credit of the above additional stoppage will be required in the Pay List in which the pay of the men appears.

With this view Medical Officers will enter the medical comforts they prescribe in such cases on W. O. Form 1145, and transmit the returns at the end of the month (or sooner, if the necessity for the issues has ceased) to the Purveyor, by whom the usual stoppage account will be rendered, as directed in Art. 261 of the Purveyors' Regulations.

Paymasters will, on receipt of the stoppage accounts, recover and credit the amounts to the Hospital Vote in the usual manner.

EDWARD LUGARD.

To Medical Officers, Paymasters, Purveyors, and others.

Circular Memorandum.

(Addressed to Medical Officers at Home and Abroad.)

Medical Branch.
No. 2—65.

Issue of a Formulary of Prescriptions.

A Formulary of Prescriptions for use in military hospitals is now issued to Medical Officers.

In authorizing its adoption throughout the service, attention is directed to the benefit likely to result from having a concise and sufficiently comprehensive Formulary of reference, equally at the command of the prescribing Officers and of the compounders to whom the prescriptions are entrusted for preparation.

In consequence of the employment of compounders in military hospitals, whose knowledge of the Latin language must, in the majority of cases, be necessarily very defective, and on whom it is not desirable to lay undue responsibity, this Formulary has been published in English, and Medical Officers are instructed to write distinctly *in English* all prescriptions which they intend to be made up by compounders.

The receipt of this Circular Memorandum, and of the accompanying Formulary to be acknowledged.

J. B. GIBSON, Director-General.

Army Medical Department, 12th August, 1865.

Circular Memorandum.

Medical Branch.
No. 3—65.

Errata in Formulary of Prescriptions.

The attention of Medical Officers is called to the following errata in the "Formulary of Prescriptions for use in Military Hospitals," recently issued, viz.:—

Page 34.—*For* "Tincture of Bark, two fluid drachms,"
read—"Tincture of Bark, two fluid *ounces*."
Page 35.—*For* "Nitric Acid, half a fluid drachm,"
"Hydrochloric Acid, one fluid drachm,"
read—"*Dilute* Nitric Acid, half a fluid drachm,"
Dilute Hydrochloric Acid, one fluid drachm."

It is requested that these corrections may be made in ink in the "Formulary" received from this Department, and the receipt of this Circular acknowledged.

J. B. GIBSON, Director-General.

Army Medical Department, 23rd October, 1865.

Circular Memorandum.

(Addressed to the Army at Home and Abroad.)

Horse Guards, S.W., 6th September, 1865.

General No. 356. Musketry. 5—1865.

Defective Vision.

In consequence of its having been brought to the notice of the Field-Marshal Commanding-in-Chief, that notwithstanding the many orders that have been issued to the contrary, soldiers who are serving as effectives in the ranks continue to be exempted from rifle practice on the plea of defective vision, His Royal Highness finds it necessary to direct that in future all men who are reported by the Medical Officer to be unable to see up to 300 yards, shall be required to fire (according to their powers of vision) at one or more of the distances comprised in the first period of practice, but not more than five rounds at each distance, and that they be classified according to the points obtained therein, such points being included in the totals from which the averages are framed which represent the merit of the shooting of each company or battalion.

His Royal Highness further desires that all men who are exempted from rifle training on the *plea of inability to see up to 150 yards, be* classified as third-class shots. The number of men thus exempted, and classified as third-class shots, is to be specified in the column of remarks in the first page of the Annual Musketry Practice Return.

When soldiers, otherwise effective, are exempted from rifle practice on the ground of defective vision, it is manifest that the "Figure of Merit" (being calculated on the performances of good shots only) ceases to be a fair criterion of the efficiency of a battalion in shooting, as compared with other corps of equal strength, in which the performances of every man in the ranks are included in the average of his company.

By command of His Royal Highness

The Field-Marshal Commanding-in-Chief,

W. PAULET, Adjutant-General.

Circular.

Statistical. No. 9.

Army Medical Department, 20th November, 1865.

Vaccination and Re-Vaccination.

With a view to obtain uniformity in the record of the results of vaccination and re-vaccination in the Army, Medical Officers are requested to classify the cases (in the Monthly Returns of Vaccination at Home, W. O. Form 1118, and the Annual Returns of Sick at Home and Abroad, W. O. Form 298, page 6) in accordance with the following description:—

Signs of Successful Vaccination.

1. "When vaccination has been successfully performed on a healthy infant, the puncture may be felt elevated on the second or third day, and soon afterwards, if examined with a magnifying glass, appears surrounded by a slight redness. On the fifth or sixth day a distinct vesicle is formed, having an elevated edge and depressed centre. On the eighth day it appears distended with a clear lymph. The vesicle, on this, its day of greatest perfection, is circular and pearl-coloured; its margin is turgid, firm, shining, and wheel-shaped. Late on the seventh, or early on the eighth day, an inflamed ring or areola begins to form around the base of the vesicle, and with it continues to increase during the two

following days. This areola is of a circular form, and its diameter extends from one to three inches. When at its height, on the ninth or tenth day, there is often considerable hardness and swelling of the subjacent cellular membrane. On the tenth or eleventh day the areola begins to subside, leaving, as it fades, two or three concentric circles of redness. The vesicle now begins to dry in the centre, and acquires there a brownish colour. The lymph which remains becomes opaque, and gradually concretes; so that about the fourteenth or fifteenth day the vesicle is converted into a hard round scab of a reddish brown colour. This scab contracts, dries, blackens, and about the twenty-first day falls off. It leaves a cicatrix which commonly is permanent in after life, circular, somewhat depressed, dotted or indented with minute pits, and in some instances radiated. The above described local changes, while in active progress, are attended by feverishness: first, from the fifth to the seventh day, so slightly that often the fact passes unobserved; and again more considerably during those days when the areola is about its height; the infant now being restless and hot, with more or less disturbance of stomach and bowels. About the same time, especially if the weather be hot, children of full habits not infrequently show on the extremities, and less copiously on the trunk, a lichenous, roseolar or vesicular eruption, which commonly continues for about a week. When vaccination is performed on such adults or adolescents as have not previously been vaccinated, and likewise when lymph is employed which has recently been derived from the cow, the resulting phenomena, as compared with the preceding description, are somewhat retarded in their course; and the areola is apt to be much more diffuse. There is also more feverishness, but eruption is less frequently seen.

"When persons who have once been efficiently vaccinated are some years afterwards re-vaccinated with effective lymph, there sometimes result vesicles which, as regards their course and that of the attendant areolæ, cannot be distinguished from the perfect results of primary vaccination."

Such cases, *and such only, are to be returned* under the head of "a perfect vaccine vesicle."

Modified Vaccinia.

2. "But in cases of re-vaccination far more usually the results are more or less modified by the influence of such previous vaccination; often no true vesicles form, but merely papular elevations surrounded by areolæ; and these results having attained their maximum on or before the fifth day, afterwards quickly decline; or if vesicles form, their shape is apt to vary from that of the regular vesicle, and their course to be more rapid, so that their maturity is reached on or before the sixth day, their areolæ decline on or before the eighth day, and their scabbing begins correspondingly early. In either case the areolæ tend to diffuse themselves more widely and less regularly, and with more affection of the cellular membrane, than in primary vaccination; and the local changes are accompanied by much itching, often by some irritation of the axillary glands, and in some cases on the fourth or fifth day by considerable febrile disturbance."

Such cases are to be returned under the head of "a modified vaccine vesicle."

Definition of a Failure.

3. Cases in which no papular elevations nor vesicles are formed, and in which no result beyond slight local inflammation follows the operation, are to be returned under the head of "a failure."

J. B. GIBSON, Director-General.

N.B.—The receipt of this Circular to be acknowledged through the Principal Medical Officer.

To Medical Officers serving at Home and Abroad.

Circular Memorandum.

(Addressed to Medical Officers at Home and Abroad.)

Medical Branch.

No. 4.—65.

On Correspondence with the Medical Department.

Instances having lately occurred in which Principal and other Medical Officers have disregarded the rule laid down in the Medical Regulations, page 97, par. 8, article 4, viz.:—

"No letter is to contain more than one *distinct* subject,"

I have the honour to draw your attention to the same, and to request that you will take care that the instructions above quoted may be strictly observed in corresponding with this Department.

I have also to request that all applications for augmentations of the Medical Staff, or of any other service involving questions of finance, may be addressed to the military authorities on the spot, copies of such communications being forwarded by you to this Department.

J. B. GIBSON, Director-General.

Army Medical Department, 18th December, 1865.

$\frac{1591}{1258}$ Circular No. 936.—(Allowances.)

Home.

War Office, 30th December, 1865.

Passages for invalids in coast voyages.

The Secretary of State for War has been pleased to approve of second-class passages being for the future provided on board coastwise steamers for such military invalids as may, in consequence of the state of their health, or of the inclemency of the weather, be considered by the Medical Officers to require the protection and comfort which that class of accommodation affords.

Whenever a Commanding Officer, in the exercise of his discretion in such a case, orders a second-class passage to be provided, he will obtain from the Medical Officer a certificate showing the necessity for such provision. The certificate should be annexed to the Pay List, as a voucher in support of the increased charge.

EDWARD LUGARD.

To Officers Commanding and Paymasters.

Circular.

Statistical.

No. 10.

Medical History Sheets of all discharged men.

The attention of Medical Officers is called to the great inconvenience which arises from the Medical History Sheets of men who have been discharged from the service not being regularly transmitted to this office.

The Medical History Sheets of all men struck off the strength of their corps (unless by transfer to another corps) must be completed in all their details, and forwarded to this office *without delay*.

Inspecting Medical Officers will in future state, in their Inspection Reports, whether the instructions conveyed in this Circular have been complied with.

J. B. GIBSON, Director-General.

Army Medical Department, 30th December, 1865.

$\frac{7530}{336}$ Circular No. 943.

(Exclusive of India.)

War Office, 8th March, 1866.

Linen stained with nitrate of silver.

It has been brought to the notice of the Secretary of State for War, that considerable damage is done to public linen in military hospitals by the use of medical appliances. Lord Hartington, therefore, with the concurrence of His Royal Highness the Field Marshal Commanding-in-Chief, desires that shirts and sheets stained with nitrate of silver, but otherwise fit for use, shall be selected from the stock in store, marked with the letter D, and reserved for the use of patients suffering from diseases requiring the application of the chemical above named.

After this selection has been made, and a certain proportion, to be fixed by the Purveyor and Surgeon conjointly, of the articles so marked issued for use, any article not marked with the letter D, and bearing stains of nitrate of silver, will be assessed by the Purveyor to the extent damaged, and a charge will be made against the troops.

EDWARD LUGARD.

Circular No. 946.—(Instructions.) 24,847/2

Foreign. (Exclusive of India.)

War Office, 28th March, 1866.

Applications for increase of pay and promotion for subordinates.

Much unnecessary correspondence is imposed on this department by the unsystematic manner in which applications are made by heads of departments abroad for increase of pay and for promotion (not previously provided for in the Estimates) of members of their subordinate establishment.

It is therefore directed that in future all applications for promotion or for increase of pay (not already provided for in the Estimates) of subordinates abroad, shall, unless in exceptional cases, be sent to this office at the period when the Estimates are forwarded, accompanied by the report of the head of department, and supported by the evidence or authority which may be needed to complete the cases for submission to the Secretary of State for War for approval.

EDWARD LUGARD.

NOMINAL ROLL OF MEDICAL OFFICERS SERVING ON FULL PAY.*

DIRECTOR-GENERAL.

Sir JAMES BROWN GIBSON, M.D., K.C.B., Honorary Physician to the Queen (7th March, 1860).

INSPECTORS-GENERAL OF HOSPITALS.

NAME.	Date of Commission.	Date of Entry into the Service.	Station.
Thomas Galbraith Logan, M.D., C.B., Honorary Physician to the Queen.	8 April 1859	8 May 1828	London.
Wm. Mure Muir, M.D., C.B.	15 Feb. 1861	22 Nov. 1842	Canada.
Arthur Anderson, M.D. ..	28 Jan. 1862	16 Oct. 1835	Malta.
Geo. Stewart Beatson, M.D.	1 May 1863	13 July 1838	Bengal.
Samuel M. Hadaway ..	11 Aug. „	22 Nov. 1827	Dublin.
Thos. Ross Jameson, M.D.	17 Nov. „	10 Jan. 1834	Netley.
W. C. James Mouat, C.B..	18 Oct. 1864	14 Dec. 1838	

DEPUTY INSPECTORS-GENERAL OF HOSPITALS.

	NAME.	Date of Commission.	Date of Entry into the Service.	Station.
	Robert Lawson	8 Dec. 1854	15 May 1835	Cape of Good Hope.
	Arch. Gordon, M.D., C.B..	25 Jan. 1856	27 June 1836	Woolwich.
	John Drope McIllree ..	31 Dec. 1858	20 Feb. 1835	Edinburgh.
	George Taylor, M.D... ..	„ „	16 May 1834	Mauritius.
	Joshua Paynter	„ „	11 Jan. 1839	Shorncliffe.
	Patrick Gammie..	„ „	17 June 1836	Dublin.
	Richard Dane, M.D... ..	„ „	17 July 1835	Colchester.
	Fras. Wm. Innes, M.D., C.B.	„ „	10 Feb. 1837	Portsmouth.
	John Fraser, M.D., C.B. ..	„ „	20 Aug. 1841	Ceylon.
10	John Harry Ker Innes, C.B.	„ „	8 April 1842	Bengal.
	Thomas Longmore ..	„ „	3 Feb. 1843	Netley.
	Samuel Currie, M.D., C.B.	18 Jan. 1859	14 Oct. 1836	Bombay.
	Richard James O'Flaherty	19 July „	9 Jan. 1835	Jamaica.
	Thos. Graham Balfour, M.D.	22 „	29 April 1836	London.
	Chas. A. Gordon, M.D., C.B.	11 May 1860	8 June 1841	Bengal.
	William Rutherford, M.D.	15 Feb. 1861	2 July „	Gibraltar.
	James McGregor	28 Jan. 1862	24 July 1834	Curragh.
	John Bent	„ „	25 April 1838	
	William Dick, M.D.	17 Mar. 1863	13 May 1836	Hong Kong.
20	Robt. K. Prendergast ..	24 „ „	7 Oct. „	West Indies.
	Jas. G. Inglis, M.D., C.B..	1 May „	29 Mar. 1839	Madras.
	J. W. Chambers, M.D. ..	„ „	4 Oct. „	Cork.
	F. C. Annesley	11 Aug. „	17 Sept. „	Devonport.
	Jas. Alex. Fraser, M.D. ..	17 Nov. „	20 Dec. „	Chatham.
	Richard Coffin Elliot, C.B.	11 Oct. 1864	7 June „	Aldershot.
	Alexander Gibb, M.D. ..	18 „ „	10 Jan. 1840	New Zealand.
27	Thomas Waller Barrow ..	9 May 1865	8 June 1841	Nova Scotia.
	Local Rank.			
	William C. Maclean, M.D.	9 April 1861	..	Netley.

* Corrected to 30th June, 1866.

SURGEONS-MAJOR.

	Name.	Date of Commission.	Date of Entry into the Service.	Service.
	John Gillespie Wood, M.D.	9 Feb. 1855	11 Jan. 1839	Staff.
	Wm. Leslie Langley, M.D.	16 „ „	„ „	Staff.
	Henry Cooper Reade ..	1 May „	31 May 1839	Staff.
	John Mure, M.D. ..	6 July „	4 Oct. „	7th Dragoon Guards.
	William Sall, M.D. ..	20 „ „	10 May „	Staff.
	Henry Downes, M.D. ..	7 Sept. „	1 Nov. „	Staff.
	John Ashton Bostock, M.D., Hon. Surg. to the Queen	20 Mar. 1857	8 Feb. 1842	Scots Fusilier Guards.
	George Eleazer Blenkins ..	24 Jan. 1858	13 April 1838	Grenadier Guards.
	A. Maclean..	1 Oct. „	4 Oct. 1833	1st Depôt Battalion
10	James Somerville Litle ..	„ „	2 Nov. 1836	Royal Artillery.
	George Thomas Ferris ..	„ „	26 Sept. 1837	Staff.
	Melborne Broke Gallwey ..	„ „	24 April 1838	Staff.
	Joseph Burke	10 Jan. 1860	10 Jan. 1840	1st Bat., 3rd Foot
	Wm. Hen. Mackintosh, M.D.	22 May „	22 May „	Staff.
	John Summers, M.D. ..	29 „ „	29 „ „	91st Foot.
	Charles R. Nicoll	26 June „	26 June „	1st Bat., Gren. Gds.
	Richard Geo. Davys Banon	30 Oct. „	30 Oct. „	Staff.
	Jas. McGrigor Grant, M.D.	6 Nov. „	6 Nov. „	Staff.
	Jas. Carroll Dempster, M.D.	29 Dec. „	29 Dec. „	35th Foot.
20	William Campbell Seaman, M.D.	16 Feb. 1861	16 Feb. 1841	Staff.
	Henry Clinton Foss	26 „ „	26 Feb. „	1st Bat., 2nd Foot
	William Kilner Swettenham, M.D.	9 April „	9 April „	Staff.
	Robert Bowen	18 May „	18 May „	1st Bat., Rifle Brigade.
	Jas. John Marjoribanks Wardrop..	21 „ „	21 „ „	2nd Bat., Gren. Gds.
	John Ewing	„ „	„ „	62nd Foot.
	Ludovic Charles Stewart ..	8 June „	8 June „	78th Foot.
	Richard Gamble, M.D. ..	„ „	„ „	1st Bat., 26th Foot.
	Nesbitt Heffernan, M.B. ..	11 June „	11 „ „	Staff.
	Thomas Joliffe Tufnell ..	„ „	„ „	Staff.
30	Henry Briscoe, M.D. ..	27 Aug. „	27 Aug. „	Royal Artillery.
	George T. Galbraith, M.D.	17 Sept. „	17 Sept. „	71st Foot.
	Cosmo Gordon Logie, M.D.	5 Oct. „	5 Oct. „	Royal Horse Guards.
	Orlando Sawle Donnall ..	19 „ „	19 „ „	Staff.
	Edward Menzies	29 Oct. „	29 Oct. „	19th Hussars.
	Ethelbert Hen. Blake, M.D.	16 Nov. „	16 Nov. „	Royal Artillery.
	James Richard Ffennell ..	20 „ „	20 „ „	2nd Bat., 16th Foot.
	James Macbeth, M.D. ..	3 Dec. „	3 Dec. „	16th Lancers.
	Richd. Fras. Valpy De Lisle	10 „ „	27 Aug. „	Royal Artillery.
	Thos. Goldie Scott, M.D. ..	14 „ „	14 Dec. „	79th Foot.
40	John Elliot Carte, M.B., C.B.	31 „ „	31 „ „	2nd Bat., 14th Foot.
	Huntley Geo. Gordon, M.D.	„ „	„ „	69th Foot.
	Thomas Guy, M.D. ..	28 Jan. 1862	28 Jan. 1842	Royal Artillery.
	Robert M'Wharrie, M.D...	11 Mar. „	11 Mar. „	59th Foot.
	Sandford McVittie Lloyd, M.D.	2 April „	5 „ 1841	Staff.
	Wm. Green Trousdell, M.D.	8 „ „	8 April 1842	Royal Artillery.
	Patrick Sinclair Laing ..	„ „	„ „	Staff.
	Benjamin Swift, M.D. ..	„ „	„ „	1st Bat., 14th Foot.
	Charles Bush Hearn ..	15 „ „	15 „ „	1st Bat., 1st Foot.
	C.B. Joseph Jee, C.B. ..	„ „	„ „	1st Dragoons.
50	Thomas Best	22 „ „	22 „ „	68th Foot.
	Edward Howard	29 „ „	29 „ „	1st Bat., 20th Foot.
	Henry Lionel Cowen ..	17 June „	17 June „	Ceylon Rifles.
	Miah W. Murphy	22 July „	22 July „	Staff.
	Edward Moorhead, M.D...	2 Aug. „	2 Aug. „	29th Foot.
	Francis Reid, M.D. ..	„ „	„ „	Staff.

SURGEONS-MAJOR—*continued.*

	NAME.	Date of Commission.	Date of Entry into the Service.	Service.
	Hugh Crawford Walshe, M.D.	3 Sept. 1862	3 Sept. 1842	Royal Artillery.
	Benj. Wm. Marlow, M.D.	25 Oct. „	25 Oct. „	Staff.
	John Wyatt	9 Jan. 1863	20 May 1851	Coldstream Guards.
	George C. Meikleham, M.D.	16 June „	16 June 1843	Staff.
60	Robert Marshall Allen	30 „ „	30 „ „	Staff.
	Vere Webb	13 Oct. „	13 Oct. 1843	Staff.
	John Mullins	„ „	„ „	2nd Dragoons.
	David Reid Mackinnon	12 Dec. „	12 Dec. „	Staff.
	Alexander Barclay, M.D.	22 „ „	22 „ „	Staff.
	Alfred Crocker	26 Jan. 1864	26 Jan. 1844	2nd Bat., 3rd Foot.
	William Godfrey Watt	1 March „	1 Mar. „	15th Hussars.
	Jas. M. Scott Fogo	5 „ „	5 „ „	Royal Artillery.
	John Thomas Watson Bacot	10 May „	10 May „	Staff.
	Raphael Woolman Read	31 „ „	31 „ „	30th Foot.
70	Wm. Holmes Jephson, M.D.	12 July „	12 July „	1st Dragoon Guards.
	Chas. Hunter Fasson, M.D.	12 „ „	12 „ „	1st Bat., 17th Foot.
	Edward Baily Tuson	20 Aug. „	20 Aug. „	2nd Bat., 17th Foot.
	Edward Gilborne	28 „ „	28 „ „	Royal Artillery.
	John A. W. Thompson, M.D.	19 Nov. „	19 Nov. „	Royal Artillery.
	Hampden Hugh Massy, M.D.	22 „ „	22 „ „	Staff.
	William Munro	6 Dec. „	6 Dec. „	93rd Foot.
	Geo. Aug. Fred. Shelton, M.B.	3 Jan. 1865	3 Jan. 1845	48th Foot.
	James Mee	28 Mar. „	28 Mar. „	Royal Artillery.
	Francis Cogan	9 May „	18 May 1851	2nd Foot.
80	William Fredk. Torcato Ivey	30 „ „	30 „ 1845	Staff.
	Edward Schaw Protheroe	10 June „	10 June „	Royal Artillery.
	Fras. Hastings Baxter, M.D.	11 July „	11 July „	12th Lancers.
	Henry March Webb, M.D.	2 Sept. „	23 Sept. „	Staff.
	Thos. Esmonde White, M.D.	26 „ „	26 „ „	65th Foot.
	George William Powell	27 „ „	20 Aug. 1844	Staff.
	Thomas Moorhead, M.D.	24 Oct. „	24 Oct. 1845	Staff.
	George Fredk. Bone, M.D.	9 Dec. „	9 Dec. „	Royal Artillery.
	Henry Kendall, M.D.	16 „ „	16 „ „	7th Hussars.
	George Saunders	„ „	„ „	9th Foot.
90	Thomas Fraser, M.D.	„ „	„ „	10th Hussars.
	Henry Day Fowler	19 „ „	19 „ „	82nd Foot.
	Henry Fredk. Robertson	„ „	„ „	Staff.
	John Small	30 „ „	30 „ „	13th Foot.
	Robert Lewins, M.D.	21 Jan. 1866	13 „ 1842	Staff.
	David Stuart Erskine Bain, M.D.	23 „ „	23 Jan. 1846	Staff.
	James Leitch, M.D.	„ „	„ „	41st Foot.
	Usher Williamson Evans, M.D.	3 April „	3 April „	61st Foot.
	Richard Domenichetti, M.D.	„ „	„ „	75th Foot.
	Alexander Peile Cahill, M.D.	„ „	„ „	6th Foot.
100	Stanhope Hunter Fasson, M.D.	24 „ „	24 „ „	Royal Artillery.
	Henry Huish, M.D.	13 May „	31 Jan. 1845	3rd Hussars.
102	Michael Fenton Manifold	22 „ „	22 May 1846	34th Foot.

SURGEONS.

NAME.	Date of Commission.	Date of Entry into the Service.	Service.
Thomas Parr	21 Oct. 1853	21 July 1846	55th Foot.
George Thos. Woodman, M.D.	7 April 1854	29 Nov. 1844	Staff.
John Dunlop, M.D.	8 Dec. „	3 April 1846	Staff.
Daniel Paterson Barry	„ „	7 Aug. „	Staff.

SURGEONS—*continued.*

	NAME.	Date of Commission.	Date of Entry into the Service.	Service.
	Edward Wm. Young, D..	8 Dec. 1854	7 Aug. 1846	1st Bat., 60th Rifles.
	Francis Reynolds	„ „	„ „	Mil. Train.
	Richard Gilborne	„ „	2 Oct. „	6th Dragoon Guards.
	Alexander Smith, M.D. ..	12 Jan. 185	7 Aug. „	Royal Artillery.
	William Deeble	„ „	27 Oct. „	56th Foot.
10	Thomas Frederick Wall ..	„ „	20 Nov. „	Staff.
	Henry Fowle Smith, M.D...	„ „	23 Mar. 1847	Staff.
	Edwd. Wm. Bawtree, M.D.	19 „ „	24 Nov. 1848	Staff.
	James Edwd. Scott, M.D. ..	9 Feb. „	11 June 1847	Rifle Brigade.
	Thos. Connor O'Leary, M.B.	„ „	6 Aug. „	Royal Artillery.
	John Sheldon Furlong, M.D.	„ „	19 Nov. „	6th Dragoons.
	Thomas Crawford, M.D. ..	„ „	18 Feb. 1848	Staff.
	Jenkin Homfray Llewelyn ..	„ „	17 Mar. „	8th Hussars.
	C.C. Anthony Dickson Home C.B.	„ „	„ „	Staff,
	Edwd. Wm. Thos. Mandeville	16 „ „	25 Sept. 1846	2nd Bat., 7th Foot.
20	Dudley Hanley, M.D. ..	„ „	20 July 1847	Staff.
	James Crerar	6 April „	3 Sept. „	106th Foot.
	Robert Thornton	24 „ „	6 July 1846	Staff.
	Mathew Combe, M.D. ..	„ „	20 „ „	Royal Artillery.
	Henry Shearly Sanders ..	„ „	5 Mar. 1847	49th Foot.
	Charles Robert Robinson ..	1 May „	12 Nov. „	83rd Foot.
	Wm. Johnstone Fyffe, M.D.	„ „	27 Oct. 1848	Staff.
	Jonas King Carr, M.D. ..	11 „ „	24 July 1846	32nd Foot.
	Patrick Joseph Clarke ..	„ „	17 Mar. 1848	84th Foot.
	Andrew Acres Stoney ..	„ „	22 Dec. „	94th Foot.
30	Alexander McArthur, M.D.	„ „	„ „	Mil. Train.
	Edwd. Jas. Franklyn, M.D.	15 „ „	18 Sept. 1849	Staff.
	Henry Crisp, M.B.	22 June „	1 Oct. 1848	Staff.
	Neil Henry Stewart, M.D...	„ „	„ „	3rd Dragoon Guards.
	William Pearson Ward ..	26 „ „	14 June 1847	Royal Artillery.
	John Coghlan Haverty ..	29 „ „	3 April 1849	52nd Foot.
	George Smyth King, M.D...	29 June „	„ „	96th Foot.
	John Gorringe, M.D. ..	„ „	„ „	1st Bat., 4th Foot.
	William Thomas Black ..	20 July „	25 Sept. 1846	Staff.
	John Rambaut, M.D. ..	„ „	29 Jan. 1847	Royal Canadian Rifles.
40	John And. Woolfreyes, M.D.	„ „	13 July „	Staff.
	Charles Walter Poulton ..	„ „	8 June 1849	Staff.
	Daniel John Doherty ..	„ „	28 Aug. „	1st Bat., 13th Foot.
	William Perry	„ „	13 Sept. „	Royal Artillery.
	James Fraser, M.D... ..	25 Sept. „	1 July 1848	50th Foot.
	Andrew Leith Adams, M.D..	„ „	20 Oct. „	1st Bat., 22nd Foot.
	John Riggs Miller Lewis, M.D.	7 Dec. „	11 Feb. „	Royal Artillery.
	Thomas Park	21 „ „	13 Sept. 1849	Royal Artillery.
	Gavin Ainslie Turnbull ..	28 „ „	15 Mar. 1850	21st Hussars.
	John Duff, M.D.	8 Jan. 1856	11 May 1849	Royal Artillery.
50	John Coates, M.D.	25 „ „	16 Nov. „	24th Foot.
	Henry Vereker Bindon, M.D.	25 May „	12 June 1846	Staff.
	Thomas Ligertwood, M.B. ..	20 Oct. „	20 Oct. 1851	4th Hussars.
	John Hendley	5 Dec. „	14 Mar. „	1st Bat., 7th Foot.
	Frederick Robinson, M.D. ..	20 Mar. 1857	19 Nov. 1847	1st Bat., Scots Fus. Gds
	John James Clifford, M.D...	28 Aug. „	7 Aug. 1846	9th Lancers.
	William Lapsley	„ „	„ „	Staff.
	James Davys	4 Sept. „	9 Sept. 1851	Staff.
	Brinsley Nicholson, M.D. ..	2 Oct. „	25 „ 1846	Staff.
	John Madden	„ „	2 Oct. „	2nd Bat., 8th Foot.
60	James William Fleming ..	„ „	27 „ „	4th Dragoon Guards.
	Gordon Kenmure Hardie, M.D.	„ „	12 Feb. 1847	73rd Foot.
	ry Higgins Jones, M.D.	„ „	10 Dec. „	
	James Lewis Holloway ..	„ „	17 Mar. 1848	

SURGEONS—*continued.*

	NAME.	Date of Commission.	Date of Entry into the Service.	Service.
	James Kellie, M.D.	20 Oct. 1857	5 May 1848	17th Lancers.
	David Field Rennie, M.D. ..	„ „	19 July „	20th Hussars.
	Jas. Edwd. Clutterbuck, M.D.	„ „	22 Dec. „	42nd Foot.
	Grahame Auchinleck, M.D. ..	„ „	„ „	81st Foot.
	Frederick Douglas, M.D. ..	„ „	30 Mar. 1849	2nd Bat., 10th Foot.
	Henry Martyn Fraser, M.D.	„ „	15 June „	2nd Bat., Rifle Brigade.
70	George Wm. Peake, M.D. ..	„ „	3 Aug. „	2nd Bat., 18th Foot.
	Arthur Rudge	„ „	13 Sept. „	Royal Artillery.
	Edward Touch, M.D. ..	„ „	25 „ „	Staff.
	John Irvine, M.D.	„ „	16 Nov. „	Staff.
	John Gibbons	3 Nov. „	22 Mar. 1850	Royal Artillery.
	Richard Cooper Todd ..	„ „	19 April „	4th Bat., 60th Rifles.
	Jones Lamprey, M.B. ..	„ „	7 June „	67th Foot.
	C.C. Herbert Taylor Reade	„ „	9 Aug. „	Staff.
	Robert McNab, M.D. ..	26 Jan. 1858	24 Sept. „	53rd Foot.
	Robt. Beresford Smyth, M.D.	„ „	8 Oct. „	102nd Foot.
80	Daniel Macqueen, M.D. ..	„ „	5 Nov. „	44th Foot.
	Howell Walters Voss ..	„ „	3 Jan. 1851	Royal Artillery.
	James Carroll, M.D. ..	„ „	„ „	1st Bat., 9th Foot.
	Dudley Clifton Wodsworth..	„ „	10 „ „	70th Foot.
	William Sim Murray, M.B.	„ „	„ „	66th Foot.
	William Armstrong	„ „	„ „	16th Foot.
	George Peacocke, M.D. ..	„ „	10 Jan. „	Staff.
	Archibald Henry Fraser ..	„ „	21 Feb. „	88th Foot.
	George Edwin Gains ..	„ „	„ „	2nd Bat., 6th Foot.
	John Edward Moffatt ..	„ „	14 Mar. „	Staff.
90	Henry Bolton Hassard ..	„ „	„ „	1st Bat., 19th Foot.
	Charles William Woodroffe..	26 June „	21 „ „	2nd Bat., 1st Foot.
	Benjamin Tydd	16 July „	25 April „	2nd Bat., 23rd Foot.
	George Pain	30 „ „	8 May „	11th Hussars.
	William James Ingham ..	24 Aug. „	9 „ „	64th Foot.
	Francis Holton, M.B. ..	„ „	14 „ „	77th Foot.
	William Boyd	7 Sept. „	20 Feb. 1852	90th Foot.
	Thomas Bassett Reid ..	5 Oct. „	16 May 1851	Royal Artillery.
	Thomas Blatherwick ..	31 Dec. „	4 June 1847	Staff.
	John Knox Leet	„ „	20 May 1851	Cape Mounted Rifles.
100	Wm. Arthur Thomson, M.B.	„ „	4 Sept. „	27th Foot.
	George Paul Minchin Woodward, M.D.	„ „	12 „ „	2nd Bat., 20th Foot.
	Alexander Scott Fogo, M.D.	„ „	7 Oct. „	Royal Artillery.
	Robert Thomas Buckle, M.D.	„ „	14 „ „	72nd Foot.
	C. M. M. Miller, M.D. ..	„ „	17 „ „	Staff.
	John Lyster Jameson ..	„ „	15 Dec. „	Staff.
	Arthur Bell	„ „	2 Jan. 1852	36th Foot.
	Thomas Llewellyn Nash, M.D.	18 Jan. 1859	14 Feb. „	63rd Foot.
	Theodore Gordon Bone, M.D.	„ „	17 „ „	Staff.
	Donald Sinclair Smith ..	28 „ „	27 „ „	Staff.
110	Henry Bowles Franklin, M.D.	11 Mar. „	10 Mar. „	Royal Artillery.
	John Phillips Cunningham, M.D.	„ „	13 April „	2nd Bat., 60th Rifles.
	Thomas George FitzGerald..	8 April „	„ „	Staff.
	John O'Nial	5 May „	„ „	51st Foot.
	Duncan Robertson Rennie ..	18 Nov. „	27 „ „	31st Foot.
	Cornelius Clark Rutherford..	2 Dec. „	7 May „	18th Hussars.
	William Skeen, M.D. ..	13 „ „	8 Mar. 1855	54th Foot.
	Patrick Andrew McDermott	16 „ „	27 Sept. „	Staff.
	Frederick George Kerin ..	31 July 1860	1 July 1848	2nd Life Guards.
	Thomas Clark Brady ..	11 Sept. „	9 May 1852	8th Foot.
120	John Smith Chartres ..	„ „	„ „	100th Regiment.
	Benjamin Lane	„ „	3 July „	2nd Bat., 4th Foot.
	Arthur Jackson Greer ..	„ „	„ „	1st Bat., 21st Foot.

SURGEONS—*continued.*

	NAME.	Date of Commission.	Date of Entry into the Service.	Service.
	Thomas William Fox, M.B.	18 Sept. 1860	5 July 1852	Royal Engineers.
	John Meane	21 „ „	5 Nov. „	Staff.
	Thomas Knox Birnie ..	25 „ „	23 „ „	2nd Bat., 12th Foot.
	Alexander Fisher Bartley ..	„ „	23 Dec. „	85th Foot.
	John Alex. McMunn, M.D...	16 Nov. „	1 Jan. 1853	Staff.
	William Snell	15 Dec. 1861	6 May „	99th Foot.
	Curtiss Martin	22 „ „	15 Dec. 1855	Staff.
130	Augustus Morphew	18 June „	18 Jan. 1856	Staff.
	Charles O'Callaghan ..	6 Aug. „	15 Dec. 1854	Staff, Africa
	Watkin Sandom Whylock, M.D.	14 Jan. 1862	6 Nov. 1852	38th Foot.
	Joseph Coleman Hornsby Wright, M.D.	„ „	8 „ „	Staff.
	Robert Speedy	„ „	11 Mar. 1853	45th Foot.
	James Nicholas Bell, M.D..	„ „	1 April „	nd Bat., 5th Foot.
	Johnston Ferguson	„ „	22 „ „	st Bat., 15th Foot.
	Wm. Alex. Mackinnon, C.B.	28 „ „	18 Feb. „	57th Foot.
	William Tydd Harding ..	„ „	13 May „	2nd Bat., 18th Foot.
	William Beale Wallis ..	„ „	27 „ „	Staff.
140	Joshua Henry Porter ..	18 Feb. „	17 June „	97th Foot.
	Alexander Clark Ross, M.D.	16 May „	1 July „	92nd Foot.
	John Bradshaw	10 June „	7 May 1858	Staff, Africa.
	John Ogilvy, M.D.	8 July „	15 July 1853	Staff.
	Augustus Frederick Turner..	„ „	26 „ „	43rd Foot.
	William Stewart, M.D. ..	„ „	29 „ „	2nd Bat., 21st Foot.
	Wm. Mackenzie Skues, M.D.	„ „	„ „	109th Foot.
	George Calvert	18 „ „	1 Feb. 1859	Staff, Africa.
	James Sinclair, M.D. ..	29 „ „	5 Aug. 1853	33rd Foot.
	William Sinclair, M.D. ..	„ „	2 Sept. „	1st Bat., 10th Foot.
150	Charles Vidler Cay	9 Jan. 1863	12 June 1846	Coldstream Guards.
	Frederick Oakes	1 Feb. „	27 Feb. 1856	Staff, Africa.
	James Arthur Hanbury, M.B.	20 „ „	30 Sept. 1853	Royal Artillery.
	Robert Fleetwood Andrews..	3 Mar. „	„ „	5th Lancers.
	Owen W. George, M.D. ..	14 April „	6 June 1851	1st Life Guards.
	William Alex. White, M.D.	5 May „	18 Oct. 1853	Royal Artillery.
	Duncan A. C. Fraser, M.D...	„ „	28 „ „	103rd Foot.
	Frederick Wm. Moore ..	„ „	„ „	2nd Dragoon Guards.
	John Eldon Young, M.D. ..	12 „ „	„ „	40th Foot.
	Thomas Ravenscroft Whitty	12 „ „	11 Nov. „	Staff.
160	John Coote Ovens	12 June „	16 Dec. „	5th Dragoon Guards.
	John Halyburton Ross, M.B.	28 Aug. „	„ „	39th Foot.
	Thomas M. Bleckley ..	22 Sept. „	6 Jan. 1854	46th Foot.
	Walter Moses Gibaut ..	„ „	3 Feb. „	Royal Artillery.
	Robert Menzies	17 Nov. „	24 „ „	Royal Artillery.
	Chamney Graves Irwin, M.B.	1 Dec. „	„ „	15th Foot.
	Jas. Balfour Cockburn, M.D.	8 Jan. 1864	3 Mar. „	Royal Engineers.
	Peter Davidson, M.D. ..	15 „ „	5 Aug. 1853	Staff.
	William Marshall Webb ..	„ „	24 Mar. 1854	Staff.
	Thomas R. Williams, M.B...	„ „	„ „	28th Foot.
170	John Henry West, M.D. ..	16 Feb. „	„ „	11th Foot.
	James Henry Lewis.. ..	8 Mar. „	„ „	1st Bat., 18th Foot.
	John By Cole Reade ..	19 April „	„ „	Rifle Brigade.
	Andrew Knox Drysdale ..	10 May „	„ „	Royal Artillery.
	Benjamin Hinde	24 „ „	22 Dec. 1859	Staff, Africa.
	William WilsonMills ..	28 June „	28 Mar. 1854	Staff.
	Edward M. Sinclair, M.D. ..	„ „	„ „	Royal Artillery.
	Charles John White ..	„ „	„ „	74th Foot.
	William Cattell	12 July „	„ „	Staff.
	St. John Stanley	5 Aug. „	24 Feb. „	Staff.
180	Ormsby Bowen Miller ..	9 Sept. „	28 Mar. „	14th Hussars.
	William A. Davidson, M.D..	„ „	„ „	Staff.

SURGEONS—*continued.*

	NAME.	Date of Commission.	Date of Entry into the Service.	Service.
	Lancelot Armstrong	11 Oct. 1864	7 April 1854	13th Hussars.
	James Ekin, M.B.	18 „ „	„ „	Staff.
	Alfred Malpas Tippetts	„ „	„ „	Staff.
	David Woods	28 „ „	„ „	107th Foot.
	James Hannan	4 Nov. „	„ „	Royal Artillery.
	Thomas Clark	11 „ „	„ „	Staff.
	William Younge Jeeves	29 „ „	„ „	2nd Bat., 25th Foot.
	Frederick Tydd Abbott	30 Dec. „	„ „	2nd Bat., 24th Foot.
	Francis Levison Gower Gunn	14 Mar. 1865	23 „ 1858	Staff, Africa.
	Alexander Maclean	20 June „	7 „ 1854	Royal Artillery.
	Alexander Humfrey	„ „	„ „	98th Foot.
	Edward Louis Lundy	„ „	„ „	58th Foot.
	William Henry Pollar B.A.	„ „	„ „	22nd Foot.
	Thomas Wright	„ „	21 „ „	30th Foot.
	Thomas John Murph, M.A.	„ „	28 „ „	95th Foot.
	Peter Nevill Jackson	„ „	„ „	Staff.
	Francis S. Bennet-Lancois de Chaumont, M.D.	„ „	„ „	Staff.
	Alexander Guthrie, M.D.	„ „	„ „	Staff.
200	Edward Young Kellett	„ „	„ „	101st Foot.
	Robert Augustus Chapple	„ „	„ „	Royal Artillery.
	Charles Ricketts	„ „	„ „	Royal Artillery.
	Lucas George Hooper	„ „	„ „	104th Foot.
	Adam Graham Young	„ „	5 May „	60th Foot.
	Charles Carroll Dempster	„ „	„ „	Royal Artillery.
	John Joseph Mulock	30 „ „	„ „	Staff.
	Stephen Massett Webb, M.D.	22 Aug. „	19 „ „	23rd Foot.
	Allen Bryson, M.D.	„ „	„ „	76th Foot.
	Robert Wyatt Meadows	„ „	26 „ „	Staff.
210	Alexander Reid	12 Sept. „	„ „	89th Foot.
	Robert Watson	22 „ „	„ „	Staff.
	Richard Hungerford	„ „	„ „	Staff.
	W.C. William Geo. Nicholas Manley	20 Oct. „	20 Feb. 1855	12th Foot.
	Alexander Robt. Hudson, M.B.	7 Nov. „	26 May 1854	47th Foot.
	William Menzies Calder	21 „ „	„ „	108th Foot.
	Robert Atkinson	1 Dec. „	5 „ „	Staff.
	Benjamin Burland, M.B.	„ „	1 Dec. 1858	Staff.
	William Jasper Rendell	6 Feb. 1866	26 May 1854	Staff.
	Duncan C. Taylor, M.D.	13 „ „	„ „	Staff.
220	Leonard Kidd, M.B.	„ „	„ „	Staff.
	Edward Thiselton	„ „	7 June „	Staff.
	Leslie Ogilby Patterson	„ „	„ „	Staff.
	John Tulloch	„ „	„ „	11th Foot.
	Wallace Haward	2 Mar. „	„ „	105th Foot.
	George Flover Bankes Arden	9 „ „	9 „ „	Staff.
	George Bell Popplewell	13 „ „	„ „	Staff.
	William Henry Price	22 May „	26 May „	Staff.
	William Grantt, M.B.	„ „	9 June „	87th Foot.
	Samuel Stacy Skipton, M.D.	15 June „	„ „	Staff.
230	James Petrie Street, M.D.	„ „	„ „	Staff.

ASSISTANT-SURGEONS.

	Name.	Date of Commission.	Service.
	Arthur Guy Elkington	11 Mar. 1853	2nd Bat., Scots Fus. Guards.
	Constantine Caridi Read	13 May „	3rd Bat., Grenadier Guards.
	Henry John H. Lawrence	24 Feb. 1854	1st Bat., Grenadier Guards.
	Francis Bramley Baker	3 Mar. „	1st Bat., Scots Fus. Guards.
	Henry Turner	19 May „	2nd Bat., Scots Fus. Guards.
	Robert William Jackson	26 „ „	86th Foot.
	Thomas McSheehy, M.D.	„ „	1st Bat., 7th Foot.
	Henry Titterton, M.D.	„ „	Staff.
	John William Trotter	„ „	2nd Bat., Coldstream Guards.
10	Thomas Tarrant	16 June „	Royal Artillery.
	Alfred Hooper	„ „	Staff.
	Exham Long Hiffernan	„ „	1st Bat., 5th Foot.
	Edmund Humphrey Roberts	23 „ „	Staff.
	James Hornidge Finnemore	„ „	Royal Artillery.
	George Allan Hutton	„ „	60th Foot.
	Alexander Dudgeon Gulland	„ „	Royal Artillery.
	Thomas Teevan	30 „ „	1st Bat., 3rd Foot.
	John Sparrow	„ „	Staff.
	William Hemphill, M.D.	14 July „	Staff.
20	Richard C. Lofthouse, M.D.	„ „	14th Dragoons.
	Joseph John Thompson	„ „	Ceylon Rifles.
	Daniel O'Donovan, M.D.	„ „	Staff.
	Joseph Barker	15 „ „	Royal Artillery.
	Henry Clifford	„ „	Royal Artillery.
	Hamilton Mitchell	21 „ „	96th Foot.
	Rowland Winburn Carter	28 „ „	Staff.
	Richard Wolseley	„ „	Staff.
	Ralph Robert Scott	„ „	Staff.
	Francis Odell	„ „	Staff.
30	William Ramsay Steuart	11 Aug. „	Royal Artillery.
	Jos. Fletcher Lougheed	15 „ „	Staff.
	Francis Collins, M.D.	1 Sept. „	Royal Military College.
	John Low Erskine, M.D.	„ „	Royal Engineers.
	William Thomas Paliologus	„ „	Staff.
	David Cullen, M.D.	„ „	3rd Dragoon Guards.
	Richard William Meade	„ „	Staff.
	William Ferguson	22 „ „	Royal Engineers.
	Michael James Griffin	„ „	3rd Dragoon Guards.
	William Macnamara	6 Oct. „	4th Dragoon Guards.
40	George Henry Finlay	„ „	Staff.
	John Vernon Seddall, M.D.	13 „ „	Royal Engineers.
	George Carleton Clery	„ „	Royal Artillery.
	John Henry Hearn	„ „	Royal Artillery.
	Joseph Johnston, M.D.	27 „ „	26th Foot.
	Arthur E. T. Longhurst, M.D.	„ „	Staff.
	Augustus P. M. Corbett, M.D.	„ „	Royal Artillery.
	George Richard Woolhouse	29 „ „	Staff.
	Sydney Alder	3 Nov. „	Staff.
	James Crosse Johnston	„ „	Royal Artillery.
50	Tertius Ball, M.D.	„ „	36th Foot.
	Thomas Smith Hollingsworth	„ „	Royal Engineers.
	John Martin Hyde	„ „	84th Foot.
	Jeffry Allen Marston, M.D.	10 „ „	Royal Artillery.
	Andrew Semple, M.D.	„ „	Staff.
	Walter Leach	24 „ „	Royal Artillery.
	Oliver Barnett	„ „	11th Lancers.
	William Henry Yates	„ „	Royal Artillery.
	Francis Henry Macfadin	1 Dec. „	Military Train.
	William Fleming Cullen	„ „	Staff.
60	William Carden Roe	„	Staff.

ASSISTANT-SURGEONS—*continued.*

	NAME.	Date of Commission.	Service.
	George Monlas Slaughter	13 Dec. 1854	Staff.
	James McNeill Beatty	14 „ „	98th Foot.
	John Wild Hulseberg	„ „	Royal Artillery.
	W.C. T. E. Hale, M.D., B.A. ..	„ „	1st Bat., 7th Foot.
	Charles Dodgson Madden	„ „	Royal Artillery.
	Sampson Roch	„ „	Royal Artillery.
	William Henry Corbett, M.D. ..	15 „ „	6th Dragoons.
	Randolph Webb	„ „	Royal Artillery.
	James Jardine, M.D...	„ „	Royal Artillery.
70	Henry Sherlock	„ „	Staff.
	William Ramsay, M.D.	„ „	Canadian Rifles.
	Stephen Henry Dickerson	23 „ „	Royal Artillery.
	George McGusty Carolan	„ „	Staff.
	Herbert Chalmers Miles	„ „	Royal Artillery.
	William Ralph Lane	29 „ „	2nd Bat., Grenadier Guards.
	Henry Lloyd Randell	5 Jan. 1855	Royal Artillery.
	John George Faught	„ „	Royal Artillery.
	Edward McGill, M.D.	8 „ „	7th Dragoon Guards.
	John Wood	10 „ „	Staff.
80	Thomas Jerram Orton	17 „ „	Royal Artillery.
	Patrick Kilgour	„ „	78th Foot.
	William Henry Muschamp	23 „ „	12th Lancers.
	Alfred Jos. Lumby Hepworth ..	26 „ „	Royal Artillery.
	George Perry	29 „ „	1st Bat., Scots Fus. Guards.
	Edwin James Hopwood	„ „	Royal Artillery.
	Stewart Aaron Lithgow	3 Feb. „	17th Lancers.
	Emil Becher, M.D.	13 „ „	104th Regiment.
	Morgan Jones Jones	15 „ „	Staff.
	Andrew Robertson Smith	21 „ „	Royal Artillery.
90	Thomas Stawell Barry	22 „ „	Royal Artillery.
	Robert Henry Beale	„ „	53rd Foot.
	Frederick Mackenzie Skues	28 „ „	Staff, Africa.
	Henry Joseph Rose	6 Mar. „	Staff.
	William Henry Harris	10 „ „	Royal Artillery.
	Charles Alex. Innes, M.D.	14 „ „	16th Lancers.
	John Copeland Knipe	„ „	Staff.
	John Noble Shipton	23 „ „	2nd Dragoon Guards.
	W.C. V. M. McMaster, M.D. ..	27 „ „	18th Hussars.
	Nathaniel Norris	2 April „	41st Foot.
100	James Robert Crawford	„ „	Staff.
	John Whittle Rimmer	„ „	Royal Artillery.
	Joseph Watts	5 „ „	1st Dragoon Guards.
	George Thomas Bourke	8 „ „	Staff.
	David Stranaghan, M.D.	„ „	Staff.
	Alexander Robert Kilroy	12 „ „	Royal Artillery.
	Bradford Stiles	14 „ „	40th Foot.
	Charles Moore Jessop	17 „ „	6th Dragoons.
	Robert Turner	„ „	Staff.
	William Robert Burkitt	„ „	74th Foot.
110	John Harrison Robotham	23 „ „	7th Dragoon Guards.
	William Langford Farmer	24 „ „	16th Lancers.
	Andrew Knox Rickards	„ „	Royal Artillery.
	William Fletcher	4 May „	46th Foot.
	John Dénis Healy	5 „ „	1st Bat., 15th Foot.
	John Folliott	7 „ „	51st Foot.
	George Langford Hinde	15 „ „	Staff.
	Jno. Henry Gouldsbury Meares ..	16 „ „	Royal Engineers.
	Richard Uniacke Cashman, M.D. ..	18 „ „	Royal Artillery.
	Edwin Wilson	19 „ „	4th Dragoons.
120	Alex. Crawford Robertson	1 June „	Royal Artillery.
	William Sharpe	7 July „	Staff.

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